

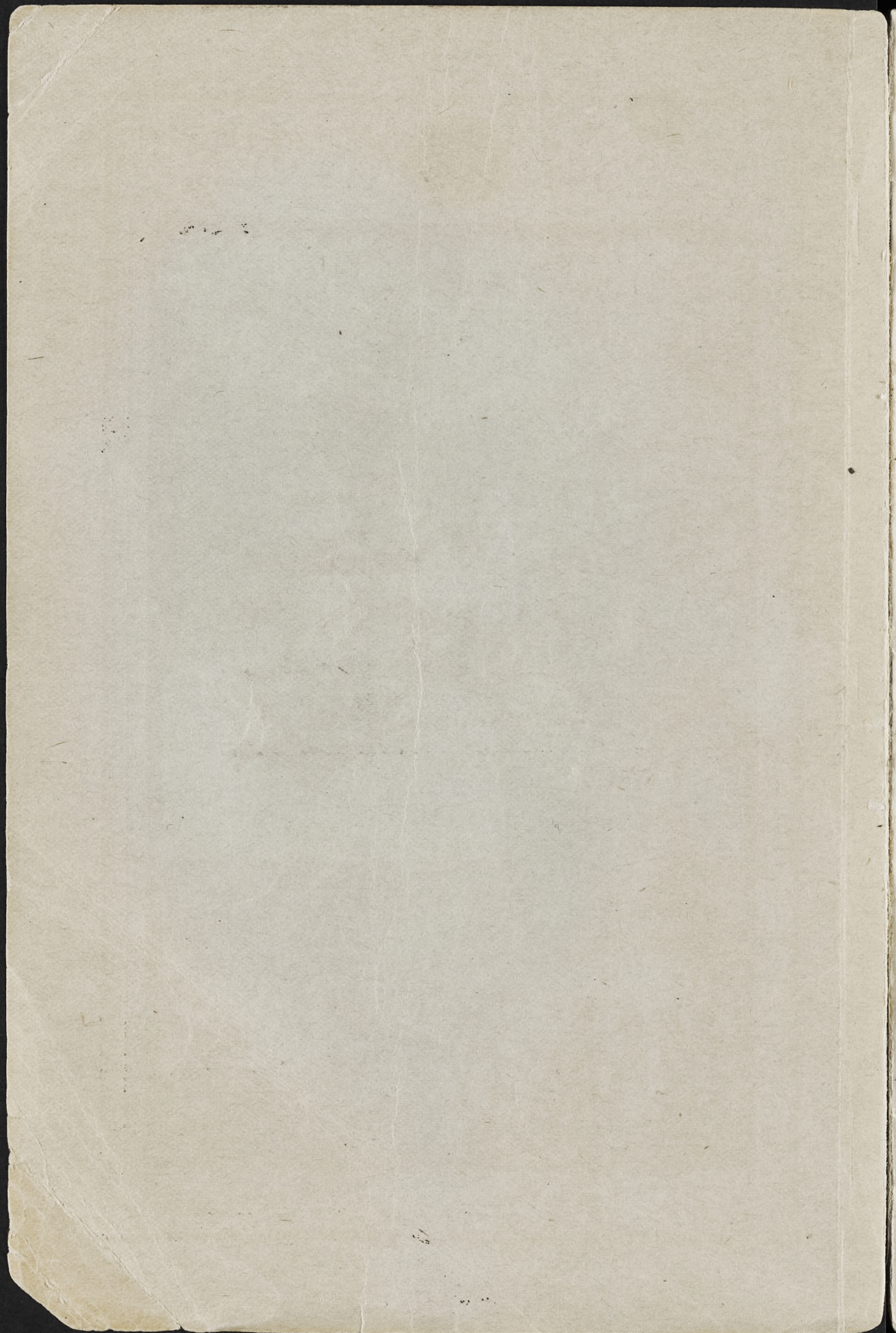
CALIFORNIA TRACTOR AND IMPLEMENT EXHIBIT CATALOGUE



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CALIFORNIA STATE FAIR

Sacramento, August 30 to September 9, 1919



TRACTOR AND IMPLEMENT
CATALOGUE

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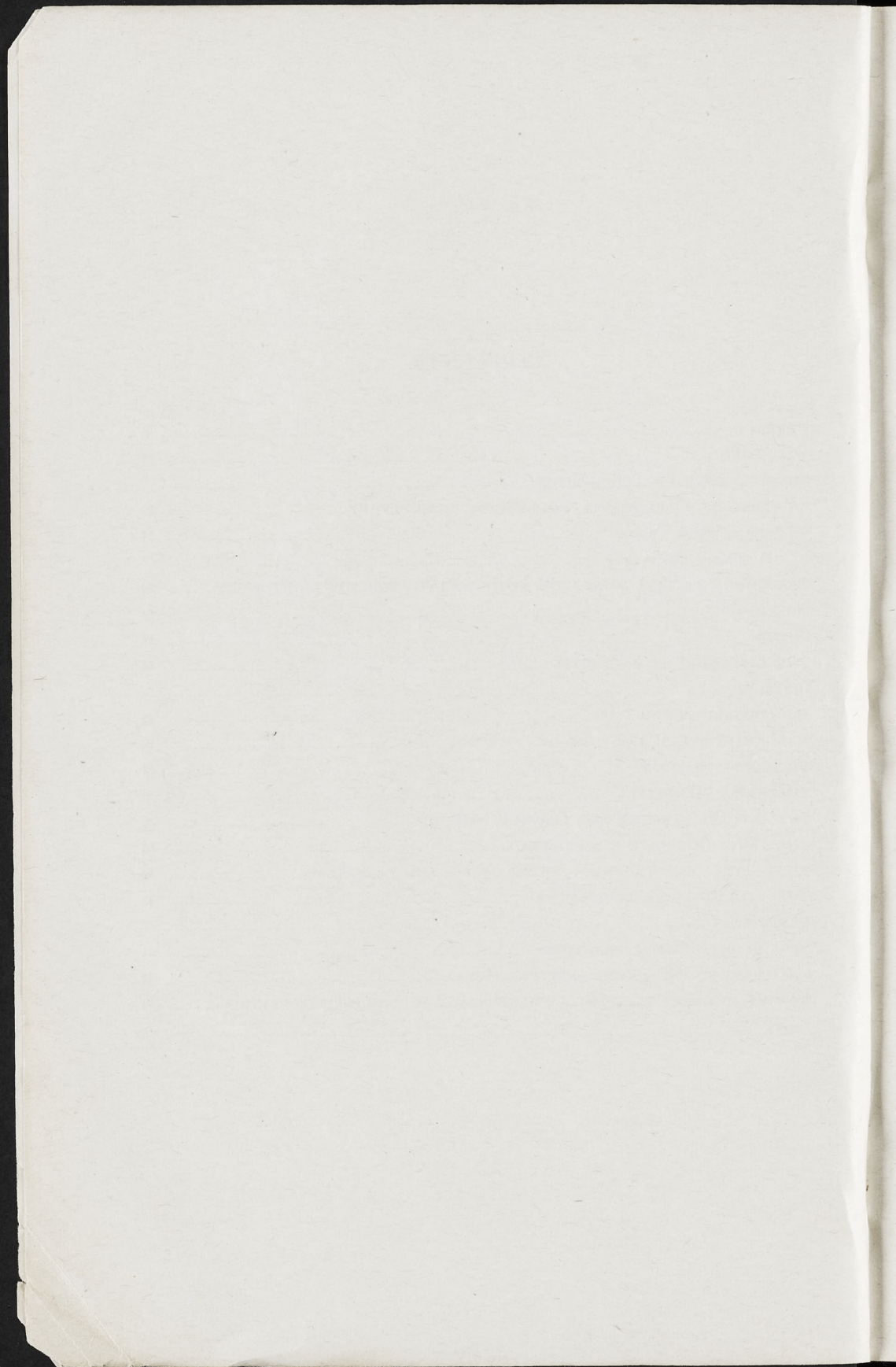
1919

COMPETITIVE RHETORIC IS A POOR SUBSTITUTE
FOR THE HABIT OF RESOLUTELY LOOKING FACTS
IN THE FACE.

—ROOSEVELT.

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PREFACE.

The best farm lands are passing rapidly into the hands of efficient farmers, men who know agriculture, understand machinery and use modern business methods.

The most far reaching change now taking place in farming is the installation of mechanical power for the operation of farm equipment.

Tillage operations, plowing, chiseling, harrowing, etc., require more power than possibly all other work on the average farm.

Mechanical power to perform these operations is best secured in the tractor, which is, therefore, of fundamental importance in the motorizing of the farm.

Literature distributed by reputable tractor manufacturers contains data on tractor operations, which shows that for many farm operations its cost per unit of work is less than that for work done by horses; that the ground may be tilled quicker and when it is in the best condition for plowing, and that the quality of its work is constant, twenty-four hours a day, because it does not become fatigued as do horses.

The ability of the tractor to perform the work required, and the economies to be had by the performance of that work with a power machine, are not questions with which this Board may concern itself.

Neither is it within the province of this Board to subscribe to the statement that there is, or will be, a single unit capable of performing all farm operations, nor to the conflicting claim that there must be one machine for heavy duty work, another for light work, and a third for transportation.

The opinion of California farmers in general, as reflected by their use of some forty different makes, and twenty sizes, shows that the industry has not yet reached a state of general standardization, and that there is no general concurrence of opinion as to the problems of farm work and no clear cut idea of the kind or type of machine best suited to accomplish it.

With this wide difference of opinion held by both manufacturers and farmers, a fair or comprehensive relative rating of tractors can not be made by this Board.

However, the ever increasing number of requests for reliable and authoritative information, not only on the merits of various types of equipment, but for the names of distributors who can supply specific articles has led the Board to issue this catalog.

Opportunity has been given manufacturers and distributors of tractors and implements whose product is available in the state to furnish

a cut of their machine and the necessary information as indicated on questionnaires sent them.

Frequent request for information on subjects, discussed neither in manufacturers' catalogs nor in the current literature, on power farming has led the Board to include in this catalog a discussion of these subjects from the farmers' standpoint, that is a consideration of the specific subject in its relation to the industry in general.

This volume contains specifications of each manufacturer's machinery and service station addresses, arranged for easy comparison with others, and articles on timely subjects, written by men foremost in the industry who are recognized leaders in their respective lines—standard information in standard form.

The California Tractor and Implement Association, an organization composed of 100 per cent of the factories, branch houses and distributors of tractors and implements of the state, has been asked to co-operate, and through its Demonstration Committee, composed of Prof. L. J. Fletcher of the University of California, C. L. Butler of Butler-Veitch, distributors of Fageol Products, George Flood of the Killefer Manufacturing Company, W. H. Gardner of the Yuba Manufacturing Company, M. M. Mathews of the Oliver Chilled Plow Works, has enlisted the services of George Collins, a man of wide experience in the tractor and implement industry to gather the material for the following pages.

STATE BOARD OF AGRICULTURE.

FOREWORD.

What is the test of efficient agriculture?

Is it the amount produced per acre? No!

Is it the amount produced per man? Yes!

Why does the farmer of the United States excel all others? Why does he work shorter hours, have larger farms and better homes, and produce more food per man?

The answer: By the use of our modern *farm machinery*.

The "man with the hoe, a brother to the ox," is swallowed up in the dust of the "man with the tractor, a brother to the hungry human kind."

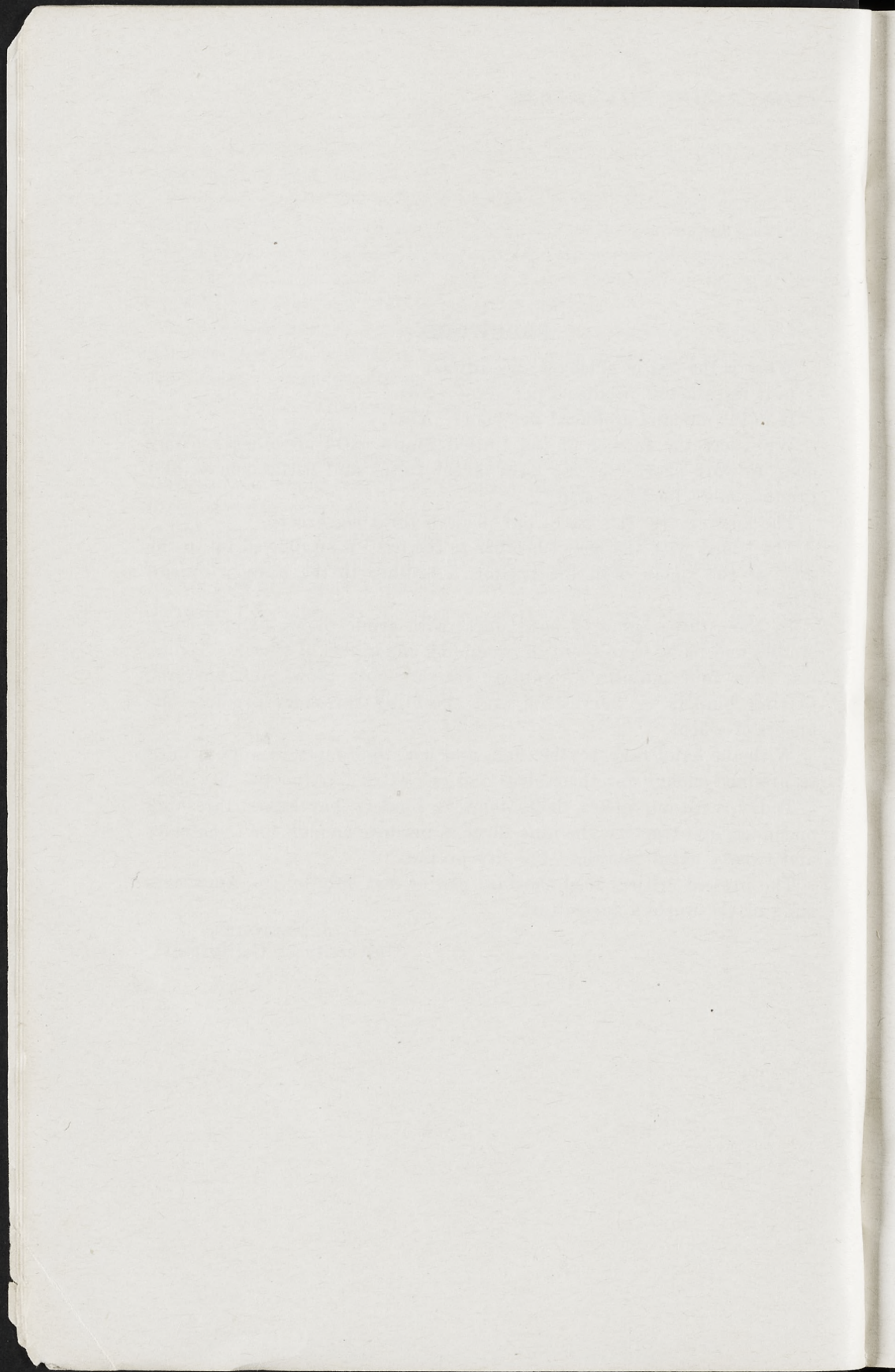
In 1850, three hours of hard work, with crude plows, hand sowing, cradles and flails, were spent in producing one bushel of wheat. Today, less than four minutes of guiding tractors with plows and harrows, driving binders or harvesters, and operating threshers produce one bushel of wheat.

With the hand rake, scythe, flail, and hoe, nine farmers worked hard to produce enough for themselves and one extra family—the city man.

Today, with our plows, drills, mowers, binders, harvesters, threshing machines, and tractors, the nine farmers produce enough for themselves and twenty extra families—the city people.

The present critical food shortage can be met only by the Americanizing of the world's agriculture.

L. J. FLETCHER,
University of California.



CORRECT TRACTOR LUBRICATION.

By STANDARD OIL COMPANY "BOARD OF LUBRICATING ENGINEERS."

In order to operate any piece of machinery it is necessary to interpose between all bearing surfaces a film of some lubricant—preferably an oil. The function of this lubricant is to adhere to and fill up the minute depressions in the bearing surfaces which it is called upon to lubricate, forming a film and acting as a cushion which absorbs the frictional heat generated and taking the wear instead of the metallic bearing surfaces themselves.

Friction is always present in any mechanism as a resisting force which tends to retard motion and bring all moving parts to a state of rest. It is estimated by engineers that in the internal combustion motor, such as is used on tractors, 20 per cent of the power developed in a correctly lubricated motor is used to overcome the friction of moving parts. This waste of power is, of course, largely increased where incorrect oils are used or where the lubricating system does not receive the proper attention by the operator.

Upon the correct lubrication of your tractor depends largely the power developed, consumption of fuel, and the expense of upkeep in repair, adjustment, and replacement of parts. It is, therefore, obvious that correct lubrication is of vital importance, and any effort made to bring about this highly desirable condition is directly beneficial in dollars and cents to the tractor operator.

TWO CONDITIONS A LUBRICATING OIL MUST MEET.

It must always be remembered that in the internal combustion engine two lubricating problems present themselves: First, the lubrication of the close-fitting crankshaft bearings which operate under normal temperatures; second, the lubrication of the wrist pins, pistons and cylinder walls which operate under high temperatures. As it is not possible to use an oil in your engine for each condition mentioned, the same oil must satisfactorily lubricate both bearings, pistons and cylinder walls under extremely varying conditions.

The correct oil for tractor engine lubrication must not have excessive body at normal temperatures in order to have sufficient body at high temperatures to correctly lubricate the wrist pins, pistons and cylinders.

CYLINDER LUBRICATION.

As cylinder lubrication is the first and most important feature, we will describe the action of the oil in your engine which is of the four cycle type.

Inlet Stroke—On previous exhaust stroke, oil was distributed on the cylinder walls and this lubricates the piston as it descends on the suction stroke, the connecting rod dipping into the oil at the bottom of the stroke.

Compression Stroke—Next, the film that has just lubricated the piston is not affected by the fresh charge of fuel and air entering the

cylinder and, consequently, will not be injured as the piston goes upward and distributes an additional supply of oil on the cylinder wall, a new supply also being splashed on the lower part of the cylinder by the connecting rod.

Power Stroke—On the power stroke this film lubricates the piston. There is a film of oil on the cylinder walls above the piston, a portion of which, that is, the outer layer of layers, is burned off. This film is not entirely destroyed: first, because the duration of the power stroke is so short, and second, lubricating oil does not burn very easily or very fast. That portion of the film which is burned off is consumed with the fuel or held in suspension. That portion which is not exhausted with the products of combustion is deposited on the cylinder, piston, valves, and spark plugs in the form of carbonaceous matter.

Exhaust Stroke—On this stroke a portion of the oil film above the piston having been burned away, the piston returning distributes a new film on cylinder walls which lubricates the pistons and cylinders on this stroke.

THE CORRECT OIL FOR CYLINDER LUBRICATION.

The correct oil for cylinder lubrication should be fluid enough so that it will quickly penetrate the minute clearances between piston and cylinder wall. It must maintain a body under the high temperatures encountered which will not allow the piston and cylinder wall to come into metallic contact. It must not thin down to the point that an excessive amount of oil will be drawn by the piston into the combustion chamber. Its characteristics must be such that the portion of the oil which is burned will be consumed with the products of combustion or held in suspension and pass out through the exhaust.

BEARING LUBRICATION.

Fluidity is the prime requisite of an oil for correct bearing lubrication; in other words, it must be fluid at the temperatures at which it is used. The correct oil, among other things, must have a low cold test, that is, it should flow readily at low temperatures.

Where too heavy oils, or oils of poor cold test are used, they can not be readily splashed to the wrist pins and cylinder walls until the motor has been run for a sufficient length of time (which may be 15 or 30 minutes or longer), so that the heat of the engine has thinned the body of the oil down to the proper degree of fluidity. During this time, excessive friction is taking place, which not only causes a loss of power and increased consumption of fuel, but manifests itself in a sluggish, unresponsive engine and excessive wear of all bearing surfaces. The bearing farthest removed from the source of supply is the wrist pin which is lubricated by the spray or splash thrown from the connecting rod. It is therefor vitally important that the body of the oil in the splash pit be light enough so that when the connecting rod strikes it, it will readily be thrown to the wrist pins as well as the cylinder walls and pistons. With heavy-bodied, sluggish, or oils of poor cold test, this is not possible.

An oil is too light for bearing lubrication when the pressure on the bearings will force the oil out from between them and allow these parts to come partially or wholly into metallic contact.

If an oil is used which is very thick or sluggish at low temperatures, the power required to shear the oil film is excessive, which means increased fuel consumption, loss of power and undue wear of all rubbing surfaces.

WHAT IS THE CORRECT OIL?

Efficiency in engine lubrication, therefore, means that the correct oil in both body and quality must be used; it must reach the working parts of the engine in a clean, efficient condition, and it must be fed to the cylinders in correct quantities, otherwise one of two things will happen—over or underfeeding.

OVERFEEDING CAUSES LOSS OF POWER AND ALSO CARBON DEPOSITS.

Overfeeding means that more oil will pass the piston rings than can be consumed and expelled through the exhaust, which results not only in lessening the value of the explosive mixture, causing loss of power, but also in excessive carbon formation, together with excessive oil consumption.

CARBON DEPOSITS.

Carbon deposit in a gas engine is residue from incomplete combustion of hydrocarbon products. In an internal combustion engine the hydrocarbons are the fuel and the lubricating oil. There is also present a certain amount of silica which enters the cylinders through the air valve of the carburetor in the form of road dust; and a small quantity of oxide of iron due to wear is frequently present.

The first and most important consideration is the combustion of the fuel, for from this source the largest proportion of carbon is deposited.

NATURE OF THE EXPLOSIVE MIXTURE.

When the charge of fuel and air (the proportions of which are determined by the carburetor adjustment) is taken into the cylinder of a gas engine, it consists of hydrocarbon vapor and air. The oxygen in the air mixes with the carbon and hydrogen of the fuel and forms an explosive mixture. This mixture is fired, and the products of combustion are expelled from the cylinder through the exhaust valve.

RICH MIXTURE EXPLAINED.

If the amount of air entering the carburetor is not sufficient to insure complete combustion, we have what is known as too rich a mixture. This is a slow-burning mixture rather than an explosive one, and will cause excessive carbon deposit.

For example, if the wick of an oil-burning lamp is turned too high, too much oil will be siphoned through the wick for the amount of air entering the lamp to form complete combustion. The lamp will smoke, and soot, which is carbon, will be deposited on the chimney. This is exactly what happens in the cylinders of a gas engine.

HOW RICH MIXTURE CAUSES CARBON.

The products of incomplete combustion of the fuel, together with a portion of lubricating oil passing by the piston rings, deposits a certain amount of carbon in the combustion chamber. That portion of this

carbon which does not pass out with the products of combustion is baked on the cylinder heads, pistons and valves by the heat of the explosion. This carbon deposit will build up very much more quickly if it has a bed to build up on, such as would be produced by a poor lubricating oil which leaves a gummy deposit when exposed to the heat of explosion.

It is necessary, in addition to carburetor adjustment, to be absolutely sure there is no obstruction in the exhaust passage of the muffler, which would set up an excess back pressure. The ignition should take place at the correct point. If the engine is operated with an overretarded spark, ignition takes place too late, and the explosive mixture, even if it were correctly proportioned, would not have time to burn up cleanly. This would cause excessive carbon deposit and overheating.

CORRECT OIL LEAVES PRACTICALLY NO CARBON.

The gas engine operator and mechanic usually figure that carbon is caused always by the lubricating oil. This is not true. If the correct oil is used in correct quantities, it will burn up cleanly and pass out of the cylinders, leaving no perceptible deposit of carbon.

WHEN LUBRICATING OIL LEAVES CARBON DEPOSITS.

It is highly important that a minimum amount of lubricating oil be allowed to pass by the piston rings. To insure this, the cylinder, piston and piston rings must be in good mechanical condition, otherwise the amount of lubricating oil passing by the piston rings will be excessive. This will not only impair the value of the mixture, causing loss of power, but will leave excessive carbon deposits.

Lubricating oil adds materially to the carbon deposits of the internal combustion engine if the following conditions exist:

1. Poorly-fitting piston rings or scored piston rings and cylinders.
2. Carrying too high an oil level; using an oil that is not suited to the engine, both as regards body and quality, or carrying the pressure in a force-feed system at too high a point.
3. Allowing the oil in the crankcase or oiling system to deteriorate to the point that it is so thin that even a well-fitting piston ring will not prevent a surplus of oil from passing into the combustion chamber.

UNDERFEEDING RESULTS IN IMPAIRED LUBRICATION.

Underfeeding means that too little oil is fed to insure correct lubrication. The result will be excess friction, causing overheating, excessive wear of all moving parts, and possible scoring of cylinders, pistons and piston rings, necessitating frequent adjustments and expensive repairs.

The efficiency of the internal combustion engine is dependent upon the amount of work derived from the heat generated by the explosion of the fuel vapor.

HEAT LOSSES THROUGH COOLING MEDIUM.

All the heat units derived from the explosive mixture are not utilized in work. The loss through the cooling medium of the average internal combustion engine is approximately from 30 to 40 per cent of the total fuel efficiency. This great loss of heat can be avoided. It is therefore

imperative that some method be provided to dissipate this heat and keep the temperature of the engine at the point of safety and efficiency.

WITHOUT COOLING ENGINE WOULD STOP.

If no cooling medium were provided, the heat of a continued series of explosions, each of which is over 2000 degrees Fahr., would soon heat the metal parts of the engine to a point where they would seize and render the operation of the engine impossible.

Overheating in an internal combustion engine occurs when the cooling medium does not maintain the temperature of the cylinders at the point of safety and efficiency.

CORRECT TEMPERATURE MEANS SAFETY AND EFFICIENCY.

It is very important that the engine should not get too hot, and, on the other hand, it is equally important that the cylinder should not be robbed of too much heat. The object of the cooling medium is to keep the temperature of the cylinders below the danger point, but at the same time keep it as hot as possible to secure the maximum power.

LUBRICATING OIL NOT A COOLING MEDIUM.

There are two sources of heat, one from fuel, the other from friction. The question of lubricating oil is directly connected with that of cooling, but it is not intended that the lubricating oil shall take the place or perform the duties of the cooling medium.

PART OIL PLAYS IN COOLING.

Lubricating oil dissipates the heat of friction generated by the pistons in the cylinders. If the cooling medium fails in its function, the temperature of the cylinders will reach a point where lubricating oil will not keep the surfaces of the pistons and cylinders apart and prevent seizing. If the lubricating oil does not perform its duty correctly, the heat of friction is added to that of the fuel, and the cooling medium will not be sufficient to keep the temperature of the motor at the point of efficiency.

CORRECT LUBRICATION DEPENDS ON PROPER COOLING.

Not less than 7 per cent of the power developed in the cylinders is absorbed to overcome the friction of the piston, and it is, therefore, necessary that the cooling medium be kept at its highest point of efficiency to enable the lubricating oil to perform its duty.

In water-cooled engines, such as are generally used on tractors, the cylinders are surrounded by water jackets in which a circulation is maintained, either by means of a pump, or in the Thermo-syphon system, by means of the difference in temperature of the water in the jackets and radiator.

REASONS FOR OVERHEATING.

Overheating in tractor motors, practically all of which employ water as the cooling medium, is due to one or more of the following causes:

Inefficient Cooling Medium—Some cooling systems are so closely proportioned that the stoppage of the fan, or sediment in the water jackets or radiator will cause the engine to overheat and the water in the radiator to boil.

Examine the Hose: Care should be taken to see that the hose used for radiator connections has not rotted and small particles of rubber deposited in the cooling system, also that the formation of scale and sediment in the water jackets is not so serious as to impair radiation.

Anti-Freezing Solution: Where anti-freezing solutions are used, in which calcium chloride forms a part of the solution, it causes a deposit to form in the radiator and water jackets which will reduce the heat conductivity of the metals exposed to the air. In this case, the temperature of the water will not be sufficiently lowered while passing through the radiator, to take care of the engine, and continued running will overheat the engine, causing the water to boil.

Cleaning Cooling System: A very effective method of removing the above deposit, sediment and particles of foreign matter from the cooling system is to fill the radiator with boiling water in which from five to seven pounds of sal soda have been dissolved. Allow this solution to stand in the radiator and water jackets for twenty-four hours, after which it should be drained off and the system thoroughly flushed out with clean water. If this is done once a month, it will keep the radiator and water jackets in very efficient condition.

Fan: The fan should always be kept in an efficient condition, care being taken to see that the belt is not slipping and that the blades have not straightened out, as in this case the fan will not draw sufficient air through the radiator to insure proper cooling.

Incorrect Mixture—Incorrect mixture causes more engine overheating than all other causes combined. A rich mixture is a slow burning rather than an explosive one. The heat units vary directly with the proportion of air and fuel taken into the cylinder, and if more fuel is taken in that will form the correct mixture, more heat will be generated than the cooling medium will take care of, which will not only show a loss of power, but will very quickly overheat the engine.

Faulty Ignition or Running with a Retarded Spark—One of the common causes of overheating is due to ignition. A late spark overheats the engine; the charge is ignited after the piston has started downward on the power stroke, consequently the hot gases are not expelled from the cylinder before the second charge is fired. This will continue until the cylinders become so hot that pre-ignition will take place, that is, the gas will ignite before the piston has reached the correct point, resulting in what is known as a "spark knock."

By advancing the spark lever on quadrant, the mixture is ignited before the piston has reached top center so that when the piston does reach the center and starts down, the gases commence to expand at the right moment thereby giving impetus to the piston and forcing the crankshaft around. By the time the piston reaches bottom center the gases are at a comparatively low temperature and are exhausted at the next upward (or exhaust) stroke of the piston.

Always operate your tractor with the spark advanced as far as possible, taking care not to advance it so far that the motor will "knock."

Missing: Missing of one or more cylinders has a tendency to overheat the motor, as the fresh gas is taken into the missing cylinder and ignited by the outgoing charge from the working cylinder, which causes muffler explosions and back pressure on the cylinders which are working.

Incorrect Valve Timing—Overheating from this cause is not common unless the valve setting has been changed after the tractor has left the factory. The flywheel is marked at the factory, and there should be no reason for heating from this source. If too much clearance is allowed between push rod and valve stem, the exhaust valve will not have sufficient opening, and this will cause heating.

Throttled Exhaust and Partially Clogged Muffler—When these conditions exist, considerable back pressure is offered to the exhaust gases with the result that the cylinder is not properly scavenged, and heating will result.

Defective Piston Rings—Broken or defective piston rings or leaky piston rings which will lower the compression will also cause overheating.

Badly Carbonized Engine—A badly carbonized engine will not only cause overheating but pre-ignition with its resultant evil effects.

Dirty Oil—If the body of the oil in the system becomes impoverished through long use and impregnated with particles of metal, carbon and dirt, it will produce a high co-efficient of friction, and overheating will result; hence the importance of regularly draining and cleaning of the crankcase and oil reservoir.

Oil of Incorrect Body—If an oil of incorrect body is used, it will cause overheating. Incorrect body means that when the oil comes in contact with the hot cylinder walls its body will partially or wholly break down and allow the metals to come in contact, resulting in an excessively high coefficient of friction overheating and possible abrasion. Incorrect body also means that if too heavy an oil is used it will not reach the wearing surfaces fast enough, and excessive friction will result, which will overheat the engine in addition to causing undue wear.

CORRECT OIL CORRECTLY USED.

By correct lubrication we mean not only the choice of the correct oil (for the very best oil will not give satisfaction if incorrectly used), but the correct use of the same, upon which maximum efficiency depends.

The average person, if called upon to define correct lubrication, would in most cases define it on a basis of brand of oil and stop there. It is very essential that a high quality brand of oil of the correct grade, suited to the motor, be used. It is equally as important that this oil be correctly used, just as correct operation is necessary in order to secure efficient results from the tractor.

The tractor manufacturer builds an efficient power plant which is designed to do a certain work and do this work economically. This power plant will do all the manufacturer claims for it, only if it is carefully and intelligently operated. To insure this the tractor manufacturer issues educational literature on the care and operation of the tractor. He also maintains an expensive service department, the object of which is to educate operators of his tractors to operate the tractors in such a way that they will get the maximum efficiency out of their machines.

One, if not the most important factor in the lubricating care of the tractor is the draining of the oil from the crankcase at regular intervals and the cleaning of both crankcase and oiling system.

The object of all power plant machinery is to develop the limit of power with the least amount of fuel and the least possible cost for adjustment and repairs. To make this possible from a lubricating standpoint the motor must not only have an efficient lubricating system, but the oil in the system must always be in a clean and efficient condition. The lubricating oil in the crankcase must be changed frequently, for several reasons. First, because lubricating oil wears out in use. In other words, it loses its lubricating value after it has been in the system for a certain length of time. Secondly, fuel which condenses in the cylinder works by the piston rings, thins down the oil and destroys its lubricating value. Thirdly, the oil becomes contaminated with the foreign matter, such as carbon, which forms on the under side of the piston; silica or dust, which enters the crankcase through the breather pipe; and oxide of iron, which comes from the wear of the bearing surfaces of the motor.

The presence of this foreign matter in the lubricating oil acts as an abrasive rather than a lubricant. Lubricating oil is intended to form a film between all moving parts such as bearings, pistons, rings and cylinders, taking the wear instead of the metallic bearing surfaces themselves. It is, therefore, cheaper from every standpoint to wear out lubricating oil than metal, and if a motor is expected to develop its maximum power and show a low fractional resistance in the bearing surfaces, the lubricant must be kept clean and it must have its maximum value.

The question of how often the lubricating oil should be changed can not be absolutely determined from a standpoint of mileage or number of hours running. It depends very largely upon the conditions under which the tractor is operated. In other words, if there is little or practically no condensation of the fuel, the oil will consequently last a great deal longer. And if the oil is fed to the motor in such a way that a minimum amount is thrown upon the inside of the piston, there will be a minimum carbon deposit formed there, which means that the oil will run for a longer time without its lubricating value being impaired.

The operator of every tractor should frequently examine the condition of the lubricating oil in the crankcase, and when there is evidence of fuel or foreign matter in the lubricating oil, it should be drained out of the crankcase. The crankcase should be washed out very carefully with kerosene and especial care taken that no kerosene is left in the crankcase when the fresh supply of oil is put in. This should be done, whether the tractor is operated 10, 30 or 100 hours. Generally speaking, where a tractor has operated under favorable conditions, the oil should be changed every 30 or 40 hours. Where kerosene is used as a fuel, the lubricating oil should be changed daily, as there is considerably more condensation in the cylinders with kerosene than with distillate or gasoline, and it is extremely difficult to keep the kerosene out of the crankcase.

It is a well-known fact among engineers and manufacturers of tractors, that the operator who is particular in the care of the lubricating system and the oil very largely increases the economical operation of his tractor, and there is nothing in the operation of a tractor which will contribute so largely in net returns as lubricating care.

UNIVERSITY OF CALIFORNIA, COLLEGE OF AGRICULTURE.

UNIVERSITY FARM, DAVIS, CALIFORNIA.

FARMERS' SHORT COURSES.

The purpose of the Farmers' Short Courses is to enable persons, especially those of mature years and ranch experience, to acquire a knowledge of the fundamental principles of agriculture and of the results of the latest investigations in the production of fruit, field and forage crops, and live stock of the various classes. These courses also furnish an excellent opportunity for people without ranch experience, who expect to engage in some line of agriculture, to obtain both theoretical and practical instruction that will prove of the greatest value to them in their farming operations.

The University Farm, where the Short Courses are held, comprises 779 acres of fine alluvial soil. It is situated at Davis, Yolo County, a station on the main line of the Southern Pacific Railroad, thirteen miles west of Sacramento and seventy-six miles from San Francisco. A ranch of 300 acres, adjoining the University Farm, has been rented by the University for a period of years, thus largely increasing the facilities for experimental work in dry farming, horticulture and animal husbandry. A large variety of products are grown on the University Farm, both by irrigation and by dry farming. The facilities for investigations on the duty of water are probably unequaled anywhere, and a most complete collection of devices for measuring water is installed so that their actual operation may be seen and understood.

There are no entrance examinations to the Farmers' Short Courses and no restriction as to sex, but applicants must be at least 18 years of age.

The Short Course in Agriculture is planned to meet the needs of farmers more especially interested in general agriculture or stock raising. Any man who is a grain farmer, a stock raiser, or a dairy farmer, or who intends to engage in any of these activities, should be greatly benefited by taking this course. If it enables him to save just one horse, or increase his dairy production five per cent, or the yield of barley only a sack per acre, he will be amply repaid for the time and expense incident to attending this course. This course is separated into two divisions of three weeks each, Crop Production and Animal Husbandry. The schedule has been arranged in such a manner that students who can not attend the full six-weeks course may take such portions thereof as are of special value and interest to them.

Farm Management—A discussion of California practices illustrated with a sample farm carried through the process of choosing, getting capital, general plan of work, layout of fields, equipment, character of crops, probable yields, selling product, accounting, cost date, leasing and selling, law questions, hiring men, and kindred subjects.

Agricultural Engineering—A study of the farm implements and machinery applicable to California agriculture; practice in rope work, power and pumping machinery, gas engines and electric motors; factors

concerned in the construction of farm buildings, and the equipment of the farm shop.

Readers seeking information on some particular subject or subjects will find each lecture and its subject, hour, and the name of the lecturer scheduled and additional information may be secured by addressing the University Farm, which will enable the busy man to find just what days it would be practicable for him to be there although he might not be able to be there all the time.

THE GAS TRACTOR SHORT COURSE.

September 16 to 25, 1919.

This course is similar to the Tractor Short Courses held at Davis since 1916, at Riverside in 1918 and 1919, and Visalia in 1918, with a total enrollment during 1919 of 480. Registration is limited to 180. The enrollment is made in the order of registration. A fee of \$1 is charged.

The Gas Tractor Short Course will consist of lectures on the principles and practice of the gas tractor and practice work in adjusting, repairing, care and operation.

At least twelve of the best makes of tractors will be available for instruction, each of which will be in charge of an experienced service man.

For detailed information write Dean of University Farm School, Davis, California.

(A similar course will be held at Riverside in February, 1920. For detailed information address Director of Citrus Experiment Station, Riverside, California.)

SCHEDULE OF THE GAS TRACTOR SHORT COURSE.

STAFF OF INSTRUCTORS.

L. J. Fletcher	H. L. Belton
R. C. Ingram	D. W. Tubbs
R. B. Lundy	J. D. Miller

and special assistants.

Tuesday, September 16:

- 8.00-12.00 Registration.
- 1.00 Opening session. Address: Dean of University Farm School.
Announcements. Lecture: Gas Engine Principles and Types.
- 2.30- 5.00 Practice work.

Wednesday, September 17:

- 8.00- 9.15 Lecture: Fuels and Carburetors.
- 9.15-12.00 Practice: Work as assigned to different groups.
- 1.00- 2.15 Lecture: Carburetor Adjustment.
- 2.15- 5.00 Practice work.

Thursday, September 18:

- 8.00- 9.15 Lecture: Ignition—High and Low Tension System.
- 9.15-12.00 Practice work.
- 1.00- 2.15 Lecture: Magnetos.
- 2.15- 5.00 Practice work.

Friday, September 19:

- 8.00- 9.15 Lecture: Magnetos—Care and Adjustment.
 9.15-12.00 Practice work.
 1.00- 2.15 Lecture: Governing and Cooling Mechanism.
 2.15- 5.00 Practice work.

Saturday, September 20:

- 8.00- 9.15 Lecture: Lubrication.
 9.15-12.00 Practice work.
 1.00- 2.15 Lecture: Testing Horsepower Rating.
 2.15- 5.00 Practice work.

Monday, September 22:

- 8.00- 9.15 Lecture: Tractor Types, Adaptability and Construction.
 9.15-12.00 Practice work.
 1.00- 2.15 Lecture: Tractor Motors.
 2.15- 5.00 Practice work.

Tuesday, September 23:

- 8.00- 9.15 Lecture: Tractor Operation.
 9.15-12.00 Practice work.
 1.00- 2.15 Lecture: Valve Timing and Adjustment of Parts.
 2.15- 5.00 Practice work.

Wednesday, September 24:

- 8.00- 9.15 Lecture: Engine Troubles.
 9.15-12.00 Practice work.
 1.00- 2.15 Lecture: Tillage Methods.
 2.15- 5.00 Practice work.

Thursday, September 25:

- 8.00- 9.15 Lecture: Tractor Management—Contracting.
 9.15-12.00 Practice: Field work.
 1.00- 2.15 Lecture: Tractor Implements, Plows.
 2.15- 5.00 Practice: Field work.

The demonstrations and practice work will consist of the following exercises assigned to different groups in turn. Opportunity will be given for each student to do the actual work as far as possible.

Carburetor adjustment.	Babbitting of bearings.
Valve timing.	Pipe fitting.
Magneto timing.	Valve grinding.
Ignition troubles.	Soldering.
Clutch adjustment.	Field practice with tractors, plows, and other tillage machines.
Gas engine testing.	Forge practice.
Inspection and operation of several tractors covering several periods.	Welding.
Repairing and overhauling.	Sharpening plowshares.

A TRACTOR FOR HEAVY WORK AND A MOTOR CULTIVATOR FOR LIGHT WORK.

By F. H. POSS, President Avery Company of the Pacific Coast.

Four years ago the first Motor Cultivator made its appearance on the tractor market; so instantaneous was its success that eleven different manufacturers exhibited and demonstrated a Motor Cultivator at the Wichita Show in Kansas this year.

The advent of the Motor Cultivator now makes possible the use of motor power exclusively, for farm work, eliminating the surplus horses which were formerly kept for light cultivating work.

The new slogan is "a Tractor for heavy work and a Motor Cultivator for light cultivating work." The demand imposed upon a tractor for heavy work makes a "combination machine" impractical, for each machine is built with the design, strength, power, speed and weight especially required for the class of work it is intended to perform. With the use of a quick detachable drawbar attachment the Motor Cultivator, because of its speed, better performs such work as mowing, raking, harrowing, drilling, etc., than does the heavy type tractor. It also fills the need of a small power plant on the farm, for feed grinding, sawing, pumping, silo filling, etc.

The new design of Motor Cultivator will successfully plant, cultivate, list and in many cases cut or harvest practically any row crop grown, performing twice as much work in a day as formerly done with a horse drawn tool.

It is the opinion of the writer that manufacturers of Motor Cultivators should so design and build their respective machines so as to make it possible for the farmer to quickly attach any standard make of planter or cultivator, or cultivator tools to each machine, as every locality requires special tools to meet the local conditions.

The Motor Cultivator is still a new tool to California, a state presenting one of its most fertile fields for operation.

HORSEPOWER.

By L. J. FLETCHER, University of California, College of Agriculture.

What is a Horsepower?

Ask a dozen tractor users this question, and a dozen different answers will usually result. Some say it is equal to the amount of work a horse can do; some, that every 150 pounds pull equals one horsepower; while others say it does not mean a "darn" thing.

Horsepower can not be measured in pounds pull or in miles per hour, but is made up of both. Contrary to popular opinion, the unit horsepower was actually derived from the amount of work a horse can do.

Force is defined as that which tends to produce motion, while *work* is a force moving a certain distance. *Power* is the rate of work.

Force is measured in pounds, while work—being a product of a force in motion—is measured in foot-pounds. For instance, if a man lifts a 100-pound box from the ground to a platform 3 feet high, he does 100 pounds \times 3 feet, or 300 foot-pounds of work. Power is measured in *horsepower*.

In using horses for raising coal from the mines in England, it was determined that the average draft horse, weighing about 1500 pounds, could raise 150 pounds of coal, while walking at the rate of $2\frac{1}{2}$ miles per hour, and keep working at this rate all day. Two and one-half miles per hour is equal to 220 feet per minute ($2\frac{1}{2}$ times 5280 divided by 60). So the mechanical horsepower, as it is called, really originated with horses and is equal to 150 pounds \times 220 feet per minute, or 33,000 foot-pounds per minute.

If a tractor is exerting a draft (or pull) of 2000 pounds, while plowing, it is doing work. The amount of power developed, then, depends entirely upon the speed. If moving 2 miles per hour the horsepower developed would be 176 feet per minute (the equivalent of 2 miles per hour), multiplied by the force 2000 pounds, and this product divided by 33,000, giving 10.7 horsepower. However, if the speed of plowing was $2\frac{1}{2}$ miles per hour the power developed would be 220×2000 divided by 33,000, or 13.3 horsepower.

The term actual horsepower is sometimes used. This is an attempt to confuse power with force, or in other words to compare simply the amount a tractor can pull with that of an equal number of horses, regardless of the speed of either. The horse has one big advantage over the tractor, and that is, when sufficiently urged, the average horse can, for a short time, exert a pull equal to $\frac{1}{2}$ to $\frac{3}{4}$ of his weight. Horses tested for maximum, horsepower, or effort, often develop from 6 to 7 horsepower for from 10 to 15 seconds at a time.

The horsepower rating of a tractor is usually given in two numbers, *i. e.*, 10-20, 12-25, 30-60, etc. The first number represents the draw bar horsepower or is the indication of the amount of work the tractor can accomplish when pulling plows, harrows, etc.

The second number is the horsepower of the motor in the tractor, or the belt horsepower. It is commonly called the brake horsepower, because in testing the tractor a large brake is attached to the pulley wheel and the amount of power determined. This is the horsepower available for operating such belt driven machines as pumps, threshing machines, ensilage cutters, etc.

It is interesting to compare the belt horse power capacity of a tractor and a horse. The tractor when pulling a plow, uses up about $\frac{1}{2}$ the power of its motor in moving itself, thus the rating 10-20, etc. However, when it is doing belt work, it is not moving itself so all of the power of the motor goes into useful work.

Since no one has yet perfected a stationary attachment for a horse, he must move himself when being used for operating belt driven machines. Thus while the tractor is nearly twice as efficient when doing belt work, the horse is less efficient on the "belt" than the "draw bar."

This accounts for the early use of the gas and steam engine for stationary use, and the more recent use of tractors for field and road work.

While the work involved in testing a tractor for draw bar horse power is slight, few tractor users possess an instrument for determining the amount the tractor is pulling. Often, when a rancher complains of his tractor not pulling enough, tests have shown that due to poor adjustment or condition of the plows, or character of the soil, the tractor is developing more than its rated horse power, or is actually overloaded.

NUMBER OF ACRES PLOWED PER TEN-HOUR DAY.

Cut in inches	Speed in miles per hour									
	1½	1¾	1½	2	2½	2¾	2½	3	3½	3¾
10	1.25	1.50	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5
12	1.50	1.80	2.10	2.4	2.70	3.0	3.30	3.6	3.90	4.2
14	1.75	2.10	2.45	2.8	3.15	3.5	3.85	4.2	4.55	4.9
16	2.00	2.40	2.80	3.2	3.60	4.0	4.40	4.8	5.20	5.4
20	2.50	3.00	3.50	4.0	4.50	5.0	5.50	6.0	6.50	7.0
24	3.00	3.60	4.20	4.8	5.40	6.0	6.60	7.2	7.80	8.4
28	3.50	4.20	4.90	5.6	6.30	7.0	7.70	8.4	9.10	9.8
30	3.75	4.50	5.25	6.0	6.75	7.5	8.25	9.0	9.75	10.5
32	4.00	4.80	5.60	6.4	7.20	8.0	8.80	9.6	10.40	10.8
36	4.50	5.40	6.30	7.2	8.10	9.0	9.90	10.8	11.70	12.6
40	5.00	6.00	7.00	8.0	9.00	10.0	11.00	12.0	13.00	14.0
42	5.25	6.30	7.35	8.4	9.45	10.5	11.55	12.6	13.65	14.7
48	6.00	7.20	8.40	9.6	10.80	12.0	13.20	14.4	15.60	16.8
50	6.25	7.50	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5
56	7.00	8.40	9.80	11.2	12.60	14.0	15.40	16.8	18.20	19.6
60	7.50	9.00	10.50	12.0	13.50	15.0	16.50	18.0	19.50	21.0
70	8.75	10.50	12.25	14.0	15.75	17.5	19.25	21.0	22.75	24.5
72	9.00	10.80	12.60	14.4	16.20	18.0	19.80	21.6	23.40	25.2
84	10.50	12.60	14.70	16.8	18.90	21.0	22.10	25.2	27.30	29.4
90	11.25	13.50	15.75	18.0	20.25	22.5	24.75	27.0	29.25	31.5
96	12.00	14.40	16.80	19.2	21.60	24.0	26.40	28.8	31.20	33.6
98	12.25	14.70	17.15	19.6	22.05	24.5	26.95	29.4	31.85	34.3
100	12.50	15.00	17.50	20.0	22.50	25.0	27.50	30.0	32.50	35.0
108	13.50	16.20	18.90	21.6	24.30	27.0	29.70	32.4	35.10	37.8
112	12.25	16.80	19.60	22.4	25.20	28.0	30.80	33.6	36.45	39.2
120	15.00	18.00	21.00	24.0	27.00	30.0	33.00	36.0	39.00	42.0
126	15.75	18.90	22.05	25.2	28.35	31.5	34.65	37.8	40.95	44.1
130	16.25	19.50	22.75	26.0	29.25	32.5	35.75	39.0	42.25	45.5
132	16.50	19.80	23.10	26.4	29.70	33.0	36.30	39.6	42.90	46.2
140	17.25	21.00	24.50	28.0	31.50	35.0	38.50	42.0	45.50	49.0
144	18.00	21.60	25.20	28.8	32.40	36.0	39.60	43.2	46.80	50.4
150	18.75	22.50	26.25	30.0	33.75	37.5	41.25	45.0	48.75	52.5
154	19.25	23.10	26.95	30.8	34.65	38.5	42.35	46.2	50.05	53.9
156	19.50	23.40	27.30	31.2	35.10	39.0	42.90	46.8	50.70	54.6
160	20.00	24.00	28.00	32.0	36.00	40.0	44.00	48.0	52.00	56.0
168	21.00	25.20	29.40	33.6	37.80	42.0	46.20	50.4	54.60	58.8
170	21.25	25.50	29.75	34.0	38.25	42.5	46.75	51.0	55.25	59.5
180	22.50	27.00	31.50	36.0	39.50	45.0	49.50	54.0	58.50	63.0
182	22.75	27.30	31.85	36.4	40.95	45.5	50.05	54.6	59.15	63.7
190	23.75	28.50	33.25	38.0	42.75	47.5	52.25	57.0	61.75	66.5
192	24.00	28.80	33.60	38.4	43.20	48.0	52.80	57.6	62.40	67.2
196	24.50	29.40	34.35	39.2	44.10	49.0	53.90	58.8	63.70	68.6
200	25.00	30.00	35.00	40.0	45.00	50.0	55.00	60.0	65.00	70.0
204	25.50	30.60	35.70	40.8	45.90	51.0	56.10	61.2	66.30	71.4
210	26.25	31.50	36.75	42.0	47.25	52.5	57.75	63.0	68.25	73.5
216	27.00	32.40	37.80	43.2	48.60	54.0	59.40	64.8	70.20	75.6
220	27.50	33.00	38.50	44.0	49.50	55.0	60.50	66.0	71.50	77.0
224	28.00	33.60	39.20	44.8	50.60	56.0	61.60	67.2	72.80	78.4
228	28.50	34.20	39.90	45.6	51.30	57.0	62.70	68.4	74.10	79.8
230	28.75	34.50	40.25	46.0	51.75	57.5	63.25	69.0	74.75	80.5

DON'TS.

By L. J. GAUTHIER, C. L. Best Gas Traction Company.

Don't throw the clutch in with a slam. Use judgment, as it will wear longer and save much annoyance.

Don't try to turn short on soft or plowed ground, either empty or pulling a load.

Don't jar or hammer near the magneto if you can avoid it.

Don't run the engine above the speed marked on number plate.

Don't start a load with the engine running slowly and the spark advanced. Get up motion first.

Don't allow the gap between the rocker arm and valve stem to become more than 1/16 inch.

Don't make a practice of running your throttle and spark lever back and forth violently.

Don't expect your motor to shoot on all four cylinders if you don't keep your spark plugs in good order.

Don't take it for granted that ignition trouble is always the cause for your engine stopping. Remember, it has to have fuel.

Don't tolerate any loose wires or poorly made connections. Fix them at once.

Don't tolerate loose bolts. Keep your tractor in trim at all times.

Don't do everything that Tom, Dick or Harry suggests.

Don't forget oil strainer in bottom of crankcase.

Don't forget that your motor is not an animal organism, repairing itself; it requires an occasional careful inspection.

Don't suppose; be certain.

Don't forget oiling instructions. Grease is cheaper than repairs and the time required to replace.

Don't run your tractor over ditches and rough places full speed. A little slowing down may save repairs.

Don't allow any of the engine bearings to pound. It is dangerous to run engine with a pound in the bearings.

Don't pour gasoline in supply tank with fire burning near the tractor.

Don't try to solder a leaky gasoline tank until first filling it full of water, and allowing to stand for some time before attempting to repair.

Don't forget to drain the water from your engine radiator and pump in freezing weather.

Don't use a file too freely on contact points in breaker box if you expect them to last; just file enough to clean them off and smooth them up.

Don't run your tractor one more round when the oil is low in crankcase.

Don't walk in front of your tractor when it is in motion.

Don't forget to use a little kerosene on your valve stems occasionally. This will cut out the gum and carbon, and will make your valves work freely.

Don't overlook any unusual sound or noise which develops in your tractor for it is a mechanical call for help and must be heeded.

Don't give the manufacturer credit for being able to guess what you want when you order extra parts. Write plainly and give full information and instructions for shipping.

THE LAST WORD IN HARVESTING.

By G. M. WALKER, Holt Manufacturing Company.

Big advances have been made in agriculture in the last few decades, but none greater than in the method of harvesting grain. Not many years ago, grain was cut with the scythe, carried by huge armfuls to the barn floor, there threshed with the flail and separated by tossing the straw into the air with ordinary pitchforks.

Then came the binder, and, in some sections, the header that, respectively, left the grain in sheaves in the field or cut off the heads and loaded them into wagons. At the same time came the threshing machines, with cylinders and concaves to do the work of the flail, yet leaving the work of separating to be done by hand. A little later these developed into grain separators that took the grain as it was cut and delivered it separated from the straw, cleaned and ready for market.

While practically all of the manufacturers of threshing machinery confined their efforts to making slight improvements in detail, a few men had the broader view that has given the world its great inventions. One of these men was Benjamin Holt. He saw the grain cut by one machine and threshed by another and said, "Why can not these machines be combined?" Then, with the pioneer's disregard of how things had been done before, he proceeded to build such a machine, that would cut, thresh, clean and sack the grain in a single operation. From that time, over thirty-three years ago, the Combined Harvester has been the foremost machine for handling grain.

The merits of this machine soon spread over the country. Today 90 per cent of the wheat yield of the Pacific Coast is gathered by Combined Harvesters.

The modern grain farmer who harvests his crop with one of these machines is free from the worries and troubles of hiring a large number of men at the time of year when labor is scarcest. He is not dependent on a shiftless, unreliable class of laborers, who demand high wages and give little service in return. He needs but four or five men to operate this outfit, and can pick them from the better class of workers, who are attracted by agreeable labor—most men are attracted by modern machinery.

Besides the saving of money and the freedom from labor troubles, there is the saving of time to be considered. Grain cut with the Combined Harvester is ready for market at the end of each day's work. The farmer is not obliged to keep his grain in stack, subject to several months' exposure to the weather and with danger of sprouting in the sack, while he waits for the custom thresherman. In case he has his own threshing outfit, he is compelled to work a double crew, or else delay his threshing till the grain is all cut.

In this way the combined harvester owner is ready to market his grain from 30 to 60 days earlier than farmers who cut and thresh their grain separately. He is ready to take advantage of the market at its best. Then, too, the owner gets top prices for his grain on account of its condition. The perfect separating, thorough cleaning qualities of

these machines are so well known that in many sections the grain buyers offer more for combined harvester grain.

The larger harvesting machinery companies of the country have designed a bulk handling equipment for combined harvesters. This is accomplished by attaching a bin of variable capacity to the side of the combined harvester. This equipment is usually available for all sizes of combined harvesters.

Bulk handling of grain will mean a reduction of at least a half in the cost of the harvesting alone, not to mention the other substantial savings made possible through a reduction of the amount of labor necessary to warehouse the grain when it is handled in sacks. It is a change that will result in the conservation of thousands of tons of wheat and barley annually, that are now wasted through leaking sacks or damaged by fire, weather, rats, mice or other vermin. Large savings in labor costs will reduce the total handling charge from harvester to mill to less than 45 cents per ton. This is in comparison with a sacking and labor charge of \$2.00 per ton in sacks.

Beans are also handled with the Combined Harvester in much the same manner as grain. A different header is used. Cylinder and cleaner speeds are changed. A different type of tooth is used in the cylinder. An extra cylinder is mounted in the center of the vibrator table. The header has a hay-tedder reel and large draper and is designed to pick up windrows in any condition, without picking up dirt.

IGNITION.

By P. FURRER, American Bosch Magneto Company.

Upon the performance of the ignition system more than on any other part depends the reliability and efficiency of the gas engine, since without proper ignition the best mixture the carburetor can produce will be wasted. Practically all tractor, truck and automobile motors use the high-tension or jump spark system, so called because the current produced by the ignition system is of sufficient voltage or pressure to jump a gap between the points of a spark plug.

As source of current a magneto, storage battery or dry cells are used. Owing to the fact that magnetos produce their own high tension current, directly within the instrument itself, without any help from a battery or coil, the magneto is almost universally used on trucks and tractors, being installed on over 95% of all tractors and trucks produced.

Another reason why magnetos are so popular on agricultural and commercial vehicles is that they are not in the least affected by climatic conditions and require practically no attention. A few drops of oil once a week is all the care a magneto needs.

Batteries are subject to climatic conditions, as cold weather affects their output. Storage batteries must be kept in a properly charged condition and supplied regularly with distilled water. In fact, battery ignition depends for its satisfactory operation very much upon the human element, which can not always be relied upon.

Further, the magneto produces a much hotter spark at normal engine speeds than the battery system, enabling it to burn more completely and more rapidly the lower grades of fuel, such as distillate and kerosene, commonly used in tractor engines. This fact has a decided influence on fuel economy, as with rapid and complete combustion more power will be developed on the same amount of fuel.

The magneto is still a mystery to many gas engine users, although in reality it is a very simple instrument. The current is produced by rotating a coil of wire wound upon a so-called armature within a permanent magnetic field. From the armature the current is led to a distributor, to be distributed to the plugs in the cylinders and the current after bridging the gap between the plug points returns to the magneto via the metal of the engine, one side of the armature coil being grounded.

The timing of the spark is accomplished by interrupting the primary circuit at the moment ignition is desired, and as the interrupter or circuit breaker is mechanically operated the spark will always occur in all cylinders at exactly the same point in the piston stroke, thereby assuring absolute synchronism.

The value of the magneto current depends upon the speed at which the armature coil cuts the magnetic lines of force, and increases of the engine revolutions.

Small engines can without difficulty be cranked rapidly enough to obtain starting on the magneto direct. Large tractor motors, which could be cranked or turned over slowly only, required the assistance of a battery for starting purposes, until the introduction of the impulse coupling or impulse starter.

This is a mechanical device interposed between magneto and magneto drive shaft and its function is to store up mechanical energy while the engine is turned over slowly by the compression of springs while the magneto armature is held stationary.

At a predetermined point the armature is released and the compressed springs impart to it a partial revolution at high speed, resulting in a very hot spark.

When the engine picks up its cycle the impulse coupling automatically ceases to function and acts then as an ordinary coupling. With the medium of the impulse coupling the largest engines can be started with ease and absolute safety, since the impulse mechanism is so arranged that the armature is not released until the piston of the cylinder ready to fire has passed over the top dead center, whether the spark control lever is in advanced or retarded position, thus preventing back-kicks, which were so common when batteries were used for starting and the timing control inadvertently left in advance position, often resulting in serious injuries to the operator.

Now a word of caution against interfering with the magneto. Over ninety per cent of the troubles encountered with magnetos are not due to any defect in the magneto itself, but are mostly caused by operators who at the first sign of engine trouble promptly begin to tear the magneto apart, and curiously enough, because the magneto is the part least understood.

In the majority of cases only a fouled spark plug, a defective cable, or cable loosened through vibration, a defective valve, improper carburetion or water in the gasoline are responsible for the trouble.

Even in the event that the magneto should be actually at fault, repairs can seldom be made on the spot, because the necessary parts and tools are lacking and it is suggested that after the operator has satisfied himself that his trouble is not due to any of the causes mentioned above the magneto be taken to the nearest service station for adjustment without first having been interfered with.

Responsible magneto manufacturers maintain service stations in charge of especially trained mechanics for the express purpose of rendering quick service to the engine user in times of need. They are equipped with all necessary tools to effect repairs quickly and dependably and at a minimum cost. Find out who represents the manufacturer of the magneto on your tractor in your district and turn to him in case of trouble.

The reliability of the magneto is best emphasized by the fact that after a short trial, by the American Expeditionary Forces, of trucks with both battery ignition and magnetos it was officially ordered by General Pershing that all trucks must have only magnetos to insure their dependability.

MOULD BOARD PLOWS.

By M. M. MATTHEWS, Manager Oliver Chilled Plow Works.

Any consideration of the question of mouldboard plowing or discussion of the merits of mouldboard plows compels, immediately, some reference to disc plows and a necessary comparison of the two systems. In the main and fundamental operation of producing a seed bed, the value of the mouldboard and share has never been challenged until the comparatively recent adaptation of the revolving concave disc, which performs the function of both share and mouldboard. It seems now to be universally accepted that the disc, while efficient in certain conditions of soil, and necessary in exceedingly sticky ground, has a limited scope of usefulness, and can never supplant the mouldboard to any great extent.

In the selection of a tractor the greatest care should be employed to obtain one that will properly handle the implements to be used behind it. The reverse is also true. In selecting a tractor plow the main point for consideration is strength to withstand strains that do not occur in plowing with teams. It is, economically speaking, well to buy a plow large enough to match the full capacity of the tractor in plowing in ideal condition of soil, but one that can be easily reduced to the number of bottoms to protect the tractor from an overload as the ground becomes harder, or when soil, locality or altitude change. For the highest powered tractors it has been conclusively demonstrated that separate units, coupled together, are more successful and economical than plows of great width built upon a single rigid frame in one unit. The reasons are obvious. The coupled plows are compact and provide the flexibility needed in uneven ground, and in case of accident or

breakage of a part, the damaged unit may be quickly set out and the work proceed, avoiding idleness for the entire outfit. Units may also be readily detached to reduce the load on the engine where increased depth of plowing or extreme hardness of soil make it advisable or necessary. This style of built-up plow has met the requirements of big ranchers and plowing contractors of California to their entire satisfaction, and supersedes both the single unit platform gangs and the use of gang plows strung out at great length and drawn separately in tandem fashion.

Too much stress can not be laid on the need of intelligent selection of the plow bottoms. This refers to the shape and stability, but more especially to the material. In sandy and rocky conditions and in all soils containing grit nothing but chilled bottoms should be considered. In fact, any soil that is not extremely sticky in its nature can be handled more economically and with less draft with chilled plows than with steel. The lessening of the draft is due to the greater hardness of the chilled mouldboards in comparison to the highly tempered steel, and to the fact that grit and gravel do not scratch or roughen chilled metal to cause friction and retard the slipping of the soil. These facts are well known to the California ranchers, as well as the facts that the chilled metal can not be damaged by rust, and that the wearing life of chilled metal is as many times greater than steel as the cost is less. Another contributing factor of advantage of chilled plows over steel which is admitted as existing, but the reason of it is not so clearly and generally understood, is the shape of the plow bottom which can be and is produced in chilled metal that does not appear nor can it be produced in steel bottoms. Chilled bottoms designed with a set over standard so as to center the load to the line of draft, fitted with shares molded with sloping shearing shins, and with the hardened chilled mouldboards, can not be equalled for lightness of draft, nor turning and pulverizing qualities. Upon the proper suction on both point and wing of the share depends the best results in plowing. Suction in chilled shares, which are designed with more or less to suit the varying conditions, is a fixed proposition, thus avoiding the trouble often created by blacksmiths who destroy or change the suction of steel shares in sharpening. Four or five chilled shares can be bought for the price of one steel share, and in many soils of California the chilled share will outwear the steel.

Very considerable more deep plowing is being practiced in California than formerly. The increased and required draft power has been better met by tractors than teams and the advent of the tractor has encouraged deep tillage. Thousands of acres, with an underlying plow sole, that have produced unprofitably light crops are being restored to their original fertility by plowing deep and ripping up this hardened stratum. Care should be used in the selection of a tractor plow for this class of work to see that the beams are high enough and the bottoms ganged far enough apart to allow the hard clods and increased volume of earth to pass through. Gang plows of ordinary clearance, when equipped with bottoms for great depth of plowing are liable to clog.

Much has been written and published lately on the important and puzzling study of proper hitches for tractor plows. The fact that

tractors and plows were originally designed separately, without special consideration of one for the other, has led to more or less trouble, but through co-operation and better understanding of the relation of the drawbar to the load, of draft lines, and side draft, of width of tractor to width of the plow and position of tractor on the land or in the furrow, these troubles are rapidly disappearing and the popularity of tractor plowing has correspondingly increased. Only a few years ago ninety per cent of the plowing in the United States was done by horses and ten per cent by tractors, but today the proportions are reversed. It has meant a tremendous burden upon plow manufacturers to meet the situation and revolutionize their production.

MANGANESE STEEL AND SOME OF ITS USES.

Edited by G. V. WOOD of the Taylor-Wharton Iron and Steel Company.

HOW MANGANESE STEEL IS MADE.

In November, 1892, the first heat of Manganese Steel was successfully made in this country, by the Taylor Iron and Steel Company (now the Taylor-Wharton Iron and Steel Company), at High Bridge, New Jersey, working under license of the Hadfield patents. It was then given the trade name of Tisco Manganese Steel.

The metal is distinctly an alloy steel, produced by melting the charge of pig iron and scrap in the cupola, blowing the Bessemer converter and adding to the blown metal ferromanganese previously melted in crucible furnaces.

Analyses must frequently be made of the cupola metal and blown metal and the raw material used, and every heat must be carefully analyzed to insure the uniformity of high grade material.

HARD BUT NOT BRITTLE.

It is only within recent years that the great commercial value of manganese steel has been generally known. In this material, metal workers found the novel quality or hardness without brittleness—not the glasslike hardness of unannealed chilled cast iron, but one associated with toughness.

This combination is peculiar in its resistance to cutting tools; yet the metal possesses malleability, so that, while it is commercially impracticable to drill or cut manganese steel, it can be forged cold and even drawn into fine wire.

It is, however, important to note that such freedom from brittleness can only be obtained when the metal is quenched in cold water after being heated to the proper temperature. If allowed to cool slowly it is entirely too brittle for useful service.

USED IN THE FORM OF CASTINGS.

Manganese Steel is largely used in the form of castings, and many of these find their application in the rough. Where finished, to procure a smooth and accurate surface there are two principal processes employed,

viz: Rough grinding and precision grinding, or "machining" as it is commonly called.

SOME OF ITS VARIED USES.

From its beginning some twenty-seven (27) years ago, manganese steel has played an ever-increasing part in all operations where severe wear is present, and where grit or dust so quickly shortens the life of ordinary steel.

For rock crushing and pulverizing machinery, for crushing rolls, for clay working machinery, for emery mills, or bucket elevators, conveyor chain, steam shovel and dredge parts, for chutes and grizzlies over which rock, ore, or other abrasive material is passing—manganese steel, by its almost unbelievable qualities, has practically solved the problem of frequent shut-downs and delay due to breakage or worn-out parts.

Only a few of the many and varied uses and application of this metal can be listed here—there are others too numerous to mention at this time.

The jaw plate and concave at the mine, the switch and frog in our street and steam railways, the buckets and lips of a gold dredge, and finally and most recently, the tractor—in these manganese steel has come into its own; it is pre-eminently the steel for strength and service.

COMPARISON OF WEAR.

The question of how much longer manganese steel will wear than ordinary carbon steel is difficult to answer exactly, as, on account of the much greater life of manganese steel, it is almost impossible to get data except in those installations where the wear is very excessive.

With conveyor chain there are several records of its performance in comparison with malleable iron chain—varying from five to fifteen times the life of the malleable product.

In one case a Manganese Steel chain gave over 198 days' service, with very little wear, in a place where malleable chain had to be replaced every ten (10) days.

MANGANESE STEEL IN THE TRACTOR.

With the coming of the tracklayer or crawler type of tractor a need was felt by many manufacturers of a track which would wear; which would stand up under all sorts of conditions—in other words, a track which would give maximum service at all times.

The same, of course, is true of the machine as a whole—for its sale, after all, depends directly on the ability of that machine to render service.

And by service is meant not simply the efficiency of the machine in performing the work for which it is intended, but also its ability to continue rendering that efficient service through a reasonably long period of time with minimum renewal of worn-out parts.

RIGHT MATERIAL IN THE RIGHT PLACE.

Like the automobile, the tractor has passed what might be called the educational stage—the farmer has learned to look deeper than paint and polish—to seek not only design that makes for efficiency, but to assure himself of materials that guarantee durability.

The secret of the ability of a tractor, or anything else which must meet wear and tear and hard knocks, to stand up in service is, even more than design, a matter of using the right material in the right place.

STRENGTH.

The grinding, rasping, grating wear to which chain (track) and sprockets are subjected, the tremendously abrasive action inseparable from their service—renders imperative the need for these parts of Manganese Steel.

So far we have considered only the subject of wear, but there is another characteristic of Manganese Steel which is considered by many as even more important than its supreme resistance to abrasive action, and that is strength.

Averages of countless tests show Manganese Steel to have a tensile of over 90,000 as compared to 60,000 to 80,000 in ordinary carbon steel.

RELIABLE SERVICE.

A conclusion is hardly necessary; there is no question but that Manganese Steel has come to stay in the sprockets and track of our crawler tractors.

Some manufacturers have used it for several years, others are only just starting in its use—but the farmer, the rancher, the mine owner, in short, the *user*—they have come to realize what service means, and that of all others Manganese Steel gives them that service—year in and year out.

FINANCING TRACTORS.

By NORMAN LOMBARD, President Western Farm Credit Company, New York, Kansas City, San Francisco.

Finance is the biggest problem in the Power Farming Movement today. The problem extends from the factory down to the farmer. The farmers of the United States are "sold" on tractors—no doubt about that. To see one hundred tractors, from 2 to 120 horsepower each, start off in a row and plow 200 acres in an hour and a quarter is an inspirational sight which should "sell" anyone on Power Farming. But how to acquire one of the brutes is the individual farmer's question. A farmer's income is seasonal and he needs his tractor to plant the crop for which he will not receive his money for several months. The money demands on a farmer are tremendous—live stock, fences, improvements, etc.—all are yelling for money. This makes it next to impossible for a farmer to accumulate the \$1000, or more, needed to buy the size of tractor he requires, if he must pay cash all at one time. The answer is that he must have time—he must be enabled to buy on terms.

But how?

Shall the manufacturer take his note? That merely transfers the finance problem to the manufacturer, who already has his problems aplenty and who does not want to add banking, credit and collection departments to his regular business. Furthermore, this involves a risk

of insolvency. Materials are sold on a cash basis to the factory and if cash is not received from the factory's customers bankruptcy is the result. Some of the strongest manufacturing concerns in the United States were thrown into bankruptcy by this very condition before they learned this lesson. They are not going to repeat it.

Shall the dealer take and carry the farmer's note? Impossible; the profit in the sale of a tractor is not enough to justify tying up a dealer's capital for so long a time, if he must carry it himself. If he attempts to turn it over to his local banker he finds the banker cold. Mr. Banker wants short time investments, which he can count on having paid promptly when due, without dispute. Also he wants friends. Now, he has learned that disputes between buyers and sellers make trouble for him and he keeps out of those disputes by refusing to buy such notes. He has nothing against tractors, as such, but he has had this same rule for years on life insurance notes, sewing machine notes, stud-horse notes, etc., because experience has proven such notes troublesome and unprofitable.

But there is a way out; the dealer can take the farmer's note, properly protected by a conditional sale agreement, and can send it out of town to some credit company that makes a business of handling such business and he will receive his cash immediately.

If this credit company is properly organized it will handle the collecting of his paper when it comes due, thus saving the dealer from the worst part of the job. Companies which finance automobile sales, as a rule, require their customers to do their own collecting, if the purchaser does not respond to a simple notice, but a real credit company, handling farmers' paper only, knows that if it wants to stay in business it must actually collect all cases—difficult as well as easy. A dealer who is able to secure a connection with a properly organized credit company can thus handle his time sales at no expense or risk to him and he can do twice as much business because he can sell to every responsible farmer in his neighborhood who wants to buy a tractor.

Every farmer should have a tractor. Tractors come in such a large assortment of sizes that the little lander with one acre can make money by using power. It is no longer necessary to spend dreary hours chambermaiding for a lot of four-legged oat-furnaces. Their place is in a museum. A horse consumes all the product of five acres. A tractor consumes a part of the product of a twelve-inch well. Why should a farmer hesitate when he can buy a tractor on terms even more liberal and extended over a longer time than when he buys an automobile, piano or organ?

My advice to you, Mr. Farmer, is to buy your tractor before the prices go up, as they are bound to do in company with all commodities; buy for cash if you can, but buy on terms rather than not buy at all.

THRESHING MACHINES.

By A. J. OLSON, J. I. Case Threshing Machine Company.

Like all other machinery that has been developed through the struggle for existence, threshing machines had their origin in the efforts of our ancestors to obtain their daily bread.

First came the flail with which the grain was beaten by hand. This instrument consisted of a wooden handle at the end of which a stouter and shorter stick was so hung as to swing freely. This process was necessarily slow and laborious and called for considerable physical effort.

Following this came the treading of grain by cattle on a smooth, hard floor, which lessened the physical effort and increased the output. The grain kernels were separated from the straw and chaff by winnowing, a process in which the wind greatly assisted.

In the early part of the nineteenth century a very simple and crude type of thresher was invented, from which has been developed the modern threshing machine.

Throughout the various stages the tendency has been and is now to reduce physical effort. The feeder has superseded the hand feed, the wind stacker does away with the slat stacker and the bucking of the straw away from the machine, the automatic grain handlers supplant the old register boxes and half bushel measures. With these have also come balanced cylinders with better teeth, larger surfaces for concaves and grates causing the greater percentages of kernels to be threshed out of the heads at the cylinder. The earlier types of threshers were cumbersome, hard to regulate and of limited capacity. The types of today are lighter, simpler and of greater capacity. Advanced types of threshing machines call for steel, bridge construction with the fewest possible moving parts consistent with good clean threshing and greater capacity. It is not long ago when it was common practice in making comparisons to remark slightly "it runs like a threshing machine." True, the older types were extremely noisy, but considering under what conditions these machines are operated, the present type is smooth running and has eliminated all but the noise common to the operation.

The war period has shown the importance of the threshing machine and now instead of the purchaser of one of these machines being regarded as a poor risk in financing, the banks and other agencies regard him as desirable and assist him where necessary in the purchase of a threshing outfit. Last year and the present time have called for more threshing machines than any periods heretofore known in the industry. The demand now is so great that it is difficult to fill orders. Individuals and small farm companies are in the majority this year as the old time custom thresherman finds there is more work to be done than they can take care of. The farmer, his sons and neighbors join in the work and the result is the work will be done in time and no grain lost because of delay.

While the aims of the manufacturers have been to make the thresher as simple as possible and the operation as nearly automatic as conditions will permit, it has been found impossible to make them fool proof and

self-adjusting. If one will only consider the varying conditions—long straw and tough heads, dry grain and easily cracked, wet bundles making separation hard, seeds from weeds, some which the farmer desires to save, few kernels and much straw, he will realize the importance of his knowing the proper adjustments to be made. These machines need attention, but the average farmer using ordinary “horse sense” can adjust them to do good work. Some conditions call for faster cylinder speed, some call for slower speed. One setting will need plenty of wind, another will need but very little. The almost closed sieve will handle some grains while others need a much larger opening. The good operator is constantly on the alert to detect anything wrong and like a good engineer he soon learns when anything is not right.

As it is important that the greatest percentage of grain be saved not only in these times but in less strenuous days information as to the care and operation of threshing machines will not be amiss and the following will be of assistance to the owners of threshing machines.

Upon receiving a threshing machine from the manufacturers, it will be found advisable to go over it thoroughly, tighten loose nuts, clean cinders and dirt from all oil holes, look inside machine for loose parts, try out every moving part before belting up to see that everything is free. A great many things can happen in transportation not only on the railroads but on the roads as well. Tramps get inside these machines enroute when stealing rides and as the machines have no springs, the jolting will loosen parts. A little care at the start will insure better operation and less delay.

Get acquainted with the oiling system and see that every part gets plenty of oil.

See that the main drive pulley is of proper size to give the required speed of the cylinder, which size can be determined by the dealer if the owner will give him the correct size of the belt pulley on his engine and the number of revolutions it runs per minute. This is very important as the thresher must run at its normal speed to do good work. If cylinder runs correct speed other parts will run right.

When the machine has been gone over and the belting put on, run the thresher empty for an hour or two to wear in the bearings. See that all bearings run cool and all parts are free in action.

To start threshing, be sure that the machine sets level crosswise. A spirit level on the rear axle will determine this. If the machine is not level the grain will go to one side and load the sieves up to such an extent that they can not handle it. It is not so necessary that the machine be level lengthways, in fact the rear end can be somewhat lower than the front in most cases as a slight incline assists in the travel of the grain.

As soon as the machine has been run empty for some time and all bearings found cool and parts free, the sieves set as per the manufacturer's instructions, the belts properly placed and reasonably tight, grain can be placed on the feeder carrier, heads first. While the necessary adjustments as to wind, etc., are being made, feed the thresher at half capacity. When the grain comes through clean and only the chaff and straw come from the stacker the thresher can be run to capacity. DON'T, however, expect the machine to do good work if you overload it.

While threshers are used mostly for grain threshing, they can be arranged to thresh all kinds of seeds. In this state threshers are used in great numbers to thresh beans, corn, alfalfa and even for carrot, beet and radish seeds. The principles of grain threshing apply to the threshing of all seeds, the speed of the cylinder being important.

It is not possible or necessary to minutely detail all adjustments at this time. The owner will be furnished instruction books by the manufacturers, which cover the various operations and information given gladly to the end that the best work be obtained.

THE IMPULSE STARTER AND TRACTOR IGNITION.

By R. J. EISMAN, K.-W. Ignition Company.

There is a great difference between tractor and automobile ignition, as the tractor type magneto must be designed to withstand the extremely hard service demanded of a tractor type magneto.

The requirements of a high grade tractor magneto call for simplicity in design, ruggedness of construction and a secondary spark of greater intensity in order to properly ignite the poorer grades of fuel which are used in tractor engine operation.

The simplicity of design is demanded so that the operator may make any necessary minor adjustments from time to time, and the magneto must also be very substantially built so as to eliminate any great percentage of service work, as the tractor is usually miles away from a service station and is dependent for its care upon men who are usually not very well versed in this type of work.

Tractor magnetos are subjected to more severe usage than the ignition system on any other type of engine, as they are exposed to all sorts of weather conditions, such as rain and snow, extreme heat and cold and in lots of cases operate in sections of the country where dust conditions are very severe.

In addition to this, the tractor magneto must fire the poorer grades of fuel, such as distillates, motor spirits and kerosene, at all speeds and under such extreme temperatures as 110 degrees above to 30 degrees below zero.

The true high tension magneto has always been acknowledged the highest form of ignition system, but as it required a certain amount of inertia to produce a spark before it was possible to adapt this magneto to a tractor engine, it became necessary to provide some means of producing a good hot spark at slow cranking speeds, inasmuch as a tractor engine is usually of large bore and stroke and is very hard to turn over, especially in cold weather when the oil is congealed.

These conditions caused the development of impulse starter, which is a device attached to the magneto to produce a spark of large volume, regardless of the speed at which the engine is cranked.

The impulse starter is attached directly to the magneto and is composed of one member which is fastened to the rotor shaft and the other member is operated by the drive shaft of the engine. Interposed between these two members is a coil spring.

When starting the engine, a dog is released on the impulse starter, which engages the ratchet on the magneto, holding it stationary, while the engine is being turned over a given distance which compresses the spring in the impulse starter and when the piston under compression comes to the firing point, this dog is released, allowing the spring to throw the rotor of the magneto around with a rush, producing a spark of large heat value, making possible the ignition of a very poor gas mixture, which is usually found when starting a cold motor.

After the engine has reached a predetermined speed, the starter mechanism is automatically thrown out of engagement and the magneto is driven direct.

The firing points of the magneto when starting with the impulse starter and when operating direct, are accurately timed within the magneto itself, so that the relation of one to the other always remains the same.

There is another advantage of the impulse starter in the fact that when starting an engine with the impulse starter in engagement, there is no possible chance of a backfire, inasmuch as the rotor of the magneto is stationary and can not produce a spark until it is released, which takes place just after the piston has passed dead center on the firing stroke and it is immaterial whether the circuit breaker on the magneto is left in the retard or advance position, as the movement of the circuit breaker does not affect the angular position of the spark in relation to the piston until after the impulse starter is thrown out of engagement.

Taking it all in all, the tractor type magneto requires a special design, more massive construction and more careful workmanship to meet the more exacting conditions under which it is to operate, and consequently should receive a proportionately greater amount of care from the operator in order to give maximum service under these conditions.

THE TRACTOR ENGINE IN OPERATION.

By THE VACUUM OIL COMPANY—BOARD OF MECHANICAL ENGINEERS.

GENERAL.

The carburetion system prepares the fuel charge for the engine.

The ignition system makes and distributes the spark necessary to ignite the fuel charge.

The valves, valve action and valve timing govern the intake and exhaust of the fuel charge.

The cooling system carries away the excessive heat resulting from combustion in the cylinders.

The lubricant system supplies the lubricant.

The engine requires regular inspection and intelligent supervision. To secure the highest efficiency at the lowest operating cost, supplies should be adequate and of reliable quality.

Fuel for the carburetion system, water for the cooling system, and the lubricant for the lubricating system should be supplied in sufficient quantities before using the tractor and at such intervals while in opera-

tion as to guarantee continuous, efficient operation of the engine. Serious trouble frequently results from inattention to these details.

The reliability of the ignition system should be tested and the correct operation of the valves should be inspected at regular intervals.

In the event of engine trouble, when the tractor is being driven, the following examinations should be made, which will detect possible cause or causes and assist the driver to effect temporary repairs.

CARBURETION.

Depress the carburetor float by the priming, or flooding pin. If, after the priming pin has been held down for say, ten seconds, the carburetor does not flood (overflow), examine the gasoline tank and see if there is a sufficient quantity of gasoline; if not, replenish.

If supply is sufficient, examine the "shut-off" cock in the gasoline pipe at the tank and see that it is wide open.

Examine the gasoline strainer. This is generally located in the gasoline pipe between the gasoline tank and the carburetor. Take off the strainer cap and remove the screen, which if dirty or clogged, should be cleaned by washing with gasoline from the supply pipe.

If the trouble is not with the strainer, disconnect the gasoline pipe at the carburetor, and allow the gasoline to run from the tank to this point. Flow should be clear and full. If so, reconnect the gasoline pipe.

Next, remove the needle valve (or adjusting needle), and pass a thin wire through the opening. This will clear the needle valve jet.

If the carburetor is so constructed that the jet can not be reached by this means, the carburetor should be disconnected at the manifold, at the connection of the gasoline piping, at the throttle valve rods and at the water connections to the water jacket (if the carburetor is water jacketed). Unbolt and remove the top of the carburetor, exposing the needle valve and float, which then can be cleaned, as described above.

The gasoline line is now clear from the tank to the carburetor float. To prove this—depress the priming pin of the carburetor; if the carburetor floods, gasoline supply is assured.

Next, examine the main air passage of the carburetor; see that it is free from dirt.

If the trouble occurs at high engine speed, examine the auxiliary or high speed, air valve. Remove the auxiliary air valve spring if worn or weak; for temporary use stretch the spring and increase its tension by making a tighter adjustment.

IGNITION.

Examine the switch and see that it is in proper position and making contact.

Examine the ground and other wires; see that all connections are clean and tight and that the wire terminal at the breaker box is not short circuiting, or in contact with other wiring.

Inspect the platinum contact points of trembler coil (vibrator), or magneto breaker, and see that they are clean and even.

When the cam lifts there should be a clean break, or clearance, at the magneto breaker between the platinum on the breaker arm and the platinum on the adjusting screw.

Examine the center spring contact brushes in the dust cap of the breaker box and make sure that they are free from oil or dirt, and that when the cap is secured in position these brushes rub strongly.

Care should be taken that the free brushes or springs are not lost when the dust cap is removed.

Keep the magneto clean and protect it with a hood, or cover. This will help prevent moisture, oil and road dust from collecting on the magnets and breaker box. These magneto hoods can be obtained at garages.

Remove the porcelain or mica packing glands of spark plugs and clean thoroughly. While an ordinary submerging of the plug in gasoline or alcohol will loosen and partially clean the carbon from the contact points, it is best to be thorough and remove the entire core and clean.

Adjust the gap between the spark plug points to a space about the thickness of a post-card. Too wide or too small a gap will interfere with proper ignition.

To insure the greatest rapidity of explosion consistent with complete combustion, the spark plug should be long enough to introduce the spark as near the center of the fuel charge as the construction of the combustion chamber will permit.

The two requirements of a perfect electric spark are:

- (a) Penetrating power, or intensity of electrical current.
- (b) Volume of current, or electrical fluid.

The electric spark used for ignition in the combustion chamber, must possess such pressure, or electrical intensity, as to penetrate the compressed fuel charge and such volume, or heat, as to ignite it.

A "fat" spark is relatively thick and may, or may not, be electrically strong.

A "lean" spark is relatively thin and electrically weak.

A "blue" spark indicates high to medium penetrating power.

A "red" spark indicates low penetrating power.

A "fat blue" spark is relatively thick, electrically strong and has high penetrating power. It will cause complete combustion of a correct fuel charge under either high or low compression.

A "lean blue" spark is relatively thin, electrically weak and has medium penetrating power. It will cause complete combustion of a correct fuel charge only under low compression.

A "fat red" spark is relatively thick, electrically weak and has low penetrating power. At best, it may cause complete combustion of a correct fuel charge under either high or low compression.

The purpose of the spark generated at the spark plug is twofold:

(a) To produce sufficient heat to ignite the fuel charge in the combustion chamber.

(b) To penetrate the vapor between the spark plug points, i. e., to jump across the gap.

Volume of electric current produces heat.

Pressure, or electrical intensity, produces penetrating power.

VALVES AND VALVE ACTION.

If the intake valve is not seating properly, the result will be loss of compression and power, with back-firing in the carburetor. If the exhaust valve is not seating properly, there will be loss of compression and power.

Faulty valves or valve action can be determined in the following manner:

Test for compression.

Before testing, turn the switch off and flood the carburetor.

With relief cocks open on all cylinders, except the one being tested, turn the engine over by hand. With both valves closed, and the piston ring on compression stroke, the resistance to turning is the measure of compression in that cylinder.

The compression in all cylinders should be uniform, as determined by a like test for each cylinder.

Weak compression may be corrected by investigating the valves, valve action and valve timing.

Examine valve lifters and see that there is a slight space between the bottoms of the valve stems and the tops of the lifters when the valves are on their seats and the lifters are in their lowest position. Remove the valve spring by taking out the retention pin and spring cap. Remove the valve cage cap in the cylinder head and take out the valve. If necessary, grind the valve to the seat and clean the cage thoroughly.

VALVE TIMING.

The valve timing of new tractors is correct as adjusted by the manufacturers of the various types of engines.

In the event that the engine be overhauled, we recommend that the tractor be sent to a competent man, who will set the valve timing correctly when the engine is reassembled.

DETAILED ENGINE TROUBLES—THEIR CAUSES AND REMEDIES.

ENGINE REFUSES TO START.

Causes of Trouble.

1. Gear engaged; clutch not thrown out.
2. Ignition switch off.
3. Battery run down.
4. Broken electrical current.
5. Interrupted electrical current.
6. Foul or cracked spark plug.
7. Poor compression.
8. Stuck inlet valve.
9. Insufficient fuel.
10. Water in fuel.
11. Improper fuel mixture.

Remedies.

1. Throw out clutch and disengage gears by setting gear lever in neutral position.
2. Turn switch to starting position.
3. Recharge storage battery or renew dry cells if necessary. Test every 500 miles for adequate current.
4. Examine wiring for break. See that connections at binding posts are clean and bright.
5. Lack of insulation may cause a ground connection or a short circuit. Re-wind defective wiring with tape or renew wiring.
6. Clean foul plug; replace cracked plug.
7. By hand cranking test compression.
 - (a) The piston rings may be gummed or stuck in their recesses. After a run, while the engine is still warm, introduce about two tablespoons of kerosene through the priming cocks of each cylinder and allow it to remain over night. This will free the rings.
 - (b) Poor compression may result from leakage due to warped valve head or seat, incorrect valve timing, cylinder head gasket improperly fitted or defective.
 - (c) Poor compression may be caused by a cracked spark plug core. Renew spark plug core or plug.
 - (d) Poor compression may be due to dry cylinders. In this case renew supply of lubricating oil and crank by hand until action is free and compression restored.
8. Free valve. See that valve push rod is adjusted so as to allow valve to seat properly. Examine valve spring; if weak or broken, renew.
9. Refill tank.
10. Drain tank and refill, straining fuel through chamois.
11. Adjust carburetor for proper proportions of air and fuel.

ENGINE SMOKES.

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| <ol style="list-style-type: none"> 1. Oil of incorrect body to suit piston clearance. 2. Too much oil. 3. Worn or broken piston rings. 4. Stuck piston rings. 5. Engine racing when standing or coasting. 6. Incorrect fuel mixture. 7. Metal carburetor float leaking. | <ol style="list-style-type: none"> 1. Regulate oil supply. 2. Renew piston rings. 3. Free with kerosene. 5. Adjust throttle stop at carburetor so as to throttle engine low by decreasing quantity of fuel mixture to engine when not delivering power. 6. Result—black smoke from too much fuel. Adjust needle valve of carburetor to decrease fuel supply. 7. Remove and repair float. |
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Causes of Trouble.

8. Cork carburetor float "water-logged."
9. Priming pin stuck.

Remedies.

8. Remove float, dry thoroughly and coat thinly with shellac.
9. Carburetor floods. Remove priming pin and strengthen spring.

REGULAR BUT WEAK EXPLOSIONS.

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| <ol style="list-style-type: none"> 1. Coil vibrator needs adjusting. 2. Loose spark plugs or valve caps. 3. Loose valves. 4. Weak valve spring. 5. Insufficient lift of exhaust valve. 6. Fuel mixture too "lean." 7. Fuel mixture too "rich." 8. Carburetor auxiliary air valve not working properly. 9. Insufficient lubrication. | <ol style="list-style-type: none"> 1. Test by elimination for defective action of any one or more units and see that platinum points are not loose, burned or worn. If they are, clean and adjust until plug connected with each unit sparks properly. If platinum points are badly burned or worn, renew. 2. Tighten. 3. Reseat valves by grinding; adjust plungers. 4. Take off and strengthen by stretching—or renew. 5. See that there is space between bottom of valve stem and top of lifter, when lifter is in lowest position and valve is on its seat. 6. Too much air—too little fuel. Increase fuel supply by opening needle valve. Decrease air supply by adjusting air valve. 7. Too much fuel; too little air. Increase air supply by adjusting air valve. Decrease fuel supply by adjusting needle valve. 8. Regulate and adjust valve; see that spring has proper tension and that valve seat is clean. 9. Introduce kerosene through the priming cocks in each cylinder and crank by hand, thus cleaning out old oil. Drain out the kerosene and old oil by crankcase drain cock. Refill lubricating system with correct grade of oil and crank by hand until engine is thoroughly lubricated. |
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ENGINE HISSING.

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Spark plug broken. 2. Relief cock or priming cock open. 3. Exhaust pipe loosely connected. 4. Intake manifold leaks. 5. Scored cylinder walls. | <ol style="list-style-type: none"> 1. Renew plug. 2. Close cock. 3. Tighten bracket bolts, or, if necessary, renew gaskets. 4. Examine for air leaks and repair. 5. Due to: <ol style="list-style-type: none"> (a) Broken piston rings. Rebore cylinders and renew rings. (b) No oil. Rebore cylinders and supply correct grade of oil. (c) Insufficient lubrication. Rebore cylinders and supply correct grade of oil. (d) Foreign particles drawn in through carburetor or lubricating system. Rebore cylinders; clean engine and lubricating system. |
|---|---|

IRREGULAR ACTION OF ENGINE.

- | | |
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| <ol style="list-style-type: none"> 1. Cracked spark plug. 2. Defective wire insulation. 3. Defective connections. | <ol style="list-style-type: none"> 1. Renew plug. 2. Rewind with tape or renew wiring. 3. Clean and make fast connections to binding posts. |
|--|--|

Causes of Trouble.

4. Poor contacts in timer.
5. Fuel mixture too "lean."
6. Fuel mixture too "rich."
7. Intake manifold leaks.
8. Water in fuel tank.
9. Fuel feed to carburetor partly stopped.
10. Water in fuel.
11. Worn or broken piston rings.

Remedies.

4. Clean and make adjustments for strong contacts. If platinum points in breaker or magneto are worn or burned, file points to smooth surface, and adjust so as to make a clean break. If badly worn or burned, renew platinum.

5. "Lean" mixture will be indicated by misfiring in the cylinders and backfiring in carburetor. Too much air; too little fuel. Increase fuel supply by opening the needle valve. Decrease air supply by adjusting air valve.

6. "Rich" mixture will be indicated by misfiring in the cylinders and excess black smoke in exhaust. Too much fuel; too little air. Increase air supply by adjusting air valve. Decrease fuel supply by adjusting needle valve.

7. Engine races. Examine for air leaks and repair.

8. Shut off fuel at tank. Disconnect fuel pipe at carburetor. Turn off fuel at tank and drain by drain cock into a glass tumbler. If water is present it can be seen readily at bottom of glass. Drain until fuel is free from water.

9. Result—decrease in power—probably backfire in carburetor. Flood carburetor. Shut off cock in fuel line at tank. Disconnect fuel pipe at carburetor. Open cock and note if there is a full flow of fuel. If not, examine strainer in fuel line. If unobstructed, reconnect fuel pipe at carburetor and note length of time required to fill float of carburetor after fuel is turned on from tank. If carburetor fills rapidly, a clear line is indicated. Further, the jet of carburetor may be clogged, in which case remove needle valve and clean jet.

10. Affects ignition and combustion. Water in fuel retards supply at jet of carburetor. Treatment should be as in case of obstructed jet opening as described above.

11. Renew worn or broken rings. Then use correct oil—an oil which will form a perfect piston ring seal.

ENGINE MISFIRING.

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Carbon on spark plugs due to use of an incorrect lubricant. 2. Insufficient fuel supply. 3. Fuel mixture too "lean." 4. Fuel mixture too "rich." 5. Valve stuck. | <ol style="list-style-type: none"> 1. Clean or replace plugs. Select correct oil to meet requirements of engine. 2. Replenish supply. See that "shut off" cock in fuel line is wide open and that there are no leaks. 3. Too much air; too little fuel. Increase fuel supply by opening needle valve. Decrease air supply by adjusting air valve. 4. Too much fuel; too little air. Increase air supply by adjusting air valve. Decrease fuel supply by adjusting needle valve. 5. Clean valve stem with kerosene. |
|---|---|

ENGINE STOPS.**Causes of Trouble.**

1. Ignition switch off.
2. Broken electrical circuit.
3. Spark coil vibrator stuck.
4. Contact in timer poor.
5. Insufficient spark.

Remedies.

1. Turn switch on.
2. Examine binding posts for loose connections. Examine wiring for poor insulation or break.
3. Test by elimination for defective action of any one or more units and see that platinum points are not loose, burned or worn. If they are, clean and adjust until plug connected with each unit sparks properly. If platinum points are badly burned or worn—renew.
4. Clean and make adjustments for strong contacts of magneto. If platinum points in breaker or magneto are worn or burned, file points to a smooth surface, and adjust so as to make a clean break. If badly worn or burned, renew platinum parts.
5. (a) Battery weak. Renew battery, or recharge if necessary.
(b) Magneto demagnetized. Remove and have remagnetized.
(c) Magneto breaker points not properly adjusted. Adjust gap between platinum points.
(d) Coil vibrator improperly adjusted. Test by elimination for defective action of any one or more units and see that platinum points are not loose, burned or worn. If they are, clean and adjust until plug connected with each unit sparks properly. If platinum points are badly worn, renew.
(e) Spark plug defective. Renew plug.
(f) Spark plug points improperly adjusted. Adjust gap between spark plug points to a space of about the thickness of a thin dime. Too wide or too small a gap will interfere with proper ignition.
6. Replenish supply and note that carburetor float chamber if full, i. e., flood by depressing priming pin.

ENGINE OVERHEATING.

1. Over-retarded spark.
2. Incorrect timing of valves.
3. Throttled exhaust.
4. Clogged muffler.
5. Clogged radiator.
6. Deficient water circulation.
7. Fan not working.
8. Racing engine on low gear.
9. Continued use of low gear.
10. Lack of oil, or incorrect oil.

1. After starting, spark should be advanced as far as possible at all times, unless engine labors.
2. ————
3. See that exhaust passages are clean and that exhaust valves raise sufficiently.
4. Disconnect and clean out soot and products of incomplete combustion.
5. Introduce cleaning compound into radiator and allow it to circulate while tractor is running. Then wash out thoroughly with clear water. Drain and refill.
6. (a) Test for clogging of water hose.
(b) Test for clogging of radiator, or water jackets.
(c) Test water pump for delivery.
7. Lubricate bearings and tighten belt.
8. Partially close throttle, thereby decreasing speed of engine.
9. Use low gear only when necessary.
10. Fill lubricating system with correct oil.

SLUGGISH ACTION OF ENGINE.**Causes of Trouble.**

1. Clutch slipping.
2. Cone clutch surfaces worn or dry.
3. Metal disc clutch slipping.

Remedies.

1. Adjust clutch. Wash off grease or oil.
2. Renew springs. Replace surfaces if worn badly and treat with castor oil, if dry.
3. (a) Broken or worn metal discs. Replace discs.
(b) Tighten spring.
(c) Oil too heavy. Use correct oil.

ENGINE KNOCKS.

1. Spark advanced too far.
2. Carbon deposit.
3. Fuel mixture too "rich."
4. Loose bearings.
5. Worn bearings.
6. Loose fly-wheel.
7. Cylinder loose on crank case.
8. Engine labors.
9. Metal carburetor float leaking.
10. Cork carburetor float "water-logged."
11. Priming pin stuck.

1. Premature ignition. Retard spark advance lever. For further correction, if necessary, adjust spark advance rods.
2. Results in preignition. Remove accumulated carbon from combustion chamber and make sure that piston rings are free in their recesses.
3. Reduce fuel feed by adjusting needle valve of carburetor. Adjust air valve for proper air mixture.
4. Have engine bearings fitted properly and tightened.
5. Refit, or, if necessary, renew bearings.
6. Make fly-wheel fast to shaft.
7. Tighten bolts and nuts.
8. Change to low gear or cut down load.
9. Remove and repair float.
10. Remove float, dry thoroughly and coat thinly with shellac.
11. Carburetor floods. Strengthen spring of priming pin.

EXPLOSIONS IN MUFFLER.

1. Over-retarded spark.
2. Insufficient spark.
3. Fuel mixture too weak.
4. Exhaust valve stuck.

1. Advance spark for earlier ignition.
2. (a) Battery weak. Renew battery, or recharge if necessary.
(b) Magneto demagnetized. Remove and have remagnetized.
(c) Magneto breaker points not properly adjusted. Adjust gap between platinum points.
(d) Coil vibrator improperly adjusted. Test by elimination for defective action of any one or more units and see that platinum points are not loose, burned or worn. If they are, clean and adjust until plug connected with each unit sparks properly. If platinum points are badly burned or worn—renew.
(e) Spark plug defective. Renew plug.
(f) Spark plug points improperly adjusted. Adjust gap between spark plug points to a space of about the thickness of a thin dime. Two wide or too small a gap will interfere with proper ignition.
3. Too much air; too little fuel. An unconsumed fuel charge is forced into muffler and this charge is fired by a subsequent charge. Adjust or clean carburetor so that proper fuel mixture for complete combustion is admitted into combustion chamber.
4. Remove valve cap and free valve in guide. Regrind valve if necessary. See that spring has proper strength.

OVERHEATED EXHAUST PIPE.

1. Over-retarded spark.
 2. Throttled exhaust.
1. Too much fuel. Advance spark for earlier ignition.
 2. See that exhaust valve has sufficient lift.

THE EVOLUTION OF AGRICULTURE.

By WILLIAM L. HUGHSON, Distributor for Fordson Tractors and Power Farming Machinery.

Power farming has made such rapid strides during the past few years that the ranchers, orchardists and agriculturists in general are now confronted with the problem of either adhering to the old-fashioned and antiquated way of tilling the soil or adopting the newer and more efficient method of using power farming machinery.

The war has been responsible, to a great extent, for the rapid advancement and the perfecting of different power farming tools, for "Food Will Win the War" is a slogan that still rings in our ears, and how this country rushed the foodstuffs to the hungry millions and saved a starving world is a matter of record.

In this speeding-up process the tractors and more efficient farm tools played an important part. In one instance the manufacturer of a well known tractor shipped over six thousand of his tractors to our allies in Europe, whose lands were either devastated or suffering from lack of cultivation because the man power was being used in the fighting lines. Thousands of acres were made to produce their share of food through the importation of these tractors.

Since the beginning of time, man has had to prepare a seedbed. The hieroglyphics on old Egyptian monuments, as well as other ancient records, show that a wooden stick was used to make a furrow, and branches and twigs bound together was the substitute for a harrow. While this method is apparently obsolete, it is still in use in some of the uncivilized parts of the world. Seed was broadcasted by hand over this crude seedbed, and even this principle which has been handed down from the ages is still indulged in, in many parts of our own country.

After the wooden stick came the wooden mold board plow, which held sway until an iron point was added to the share to give added wear, and permit of the working of hard soil.

In 1797 a cast iron plow bottom was made and patented. This had the share, mold board and landside all in one piece. To renew a worn point meant the purchasing of an entirely new bottom. In 1813 a cast iron bottom was manufactured that more nearly approached our present style.

Then came what seemed to the agriculturist the acme of perfection in a farm tool—the single riding plow. Many weary steps over uneven and rough ground were saved the farmer, for it must be remembered the farmer had not only to guide his horses but likewise his plows, and to be able to sit astride his new plowing device seemed, and in reality, was, a wonderful advancement in agriculture.

The single riding plow was later followed by the two gang plow, permitting the farmer to plow his ground in much less time. This style of plow enjoyed unusual popularity, showing that the farmer was ever ready to adopt any practical device that would lessen his fatiguing work.

It was during this period that the manufacturers began to pay particular attention to the kinds of materials that went into their product,

crucible steel, shares, soft-center shares and others making their appearance, all with the view of bringing greater efficiency to farm tools.

Many varied and complete mechanical farm tools and contrivances followed in rapid order, such as combined harvesters and binders and other equally important improvements; with the coming of all of these wonderful inventions the horse was still relied upon to do his part.

The coming of the farm tractor revolutionized agriculture, of this there can be no doubt. It was not the purpose of the tractor to do the work as well as a horse or a team of horses, but to do it better. It is not the purpose of power farming machinery to do the work as well as the older methods, but to do it more efficiently and more economically.

It is an established fact that the old methods of a farmer's life, with its continual chores and heavy work coupled with long hours, has been responsible for many sons and daughters leaving the old home and seeking the cities, to evade the drudgery that loomed before them.

The newer methods of power farming, however, has changed the entire scheme of things, for with the addition of a tractor, modern farm tools, the many mechanical and automatic devices, such as milking machines, sawing machines, and others, taken together with the many duties a tractor can perform when the power on the belt is used, has lightened the farmers' burden considerably, doing his work more speedily and surely more economically. This, taken together with the many devices now on the market to aid the women-folk on the ranches and farms, has changed considerably the conditions that formerly existed.

The numerous exhibits and demonstrations of power farming machinery, held all over the country, has proven much to those who till the soil, and the progressive agriculturist was not slow to see the benefits that would accrue from its adoption.

Many farmers and ranchers are still adhering to the older methods, being slow to see the advantages held out to them, adhering to these antiquated principles, in a similar manner as the livery men in the early days of the automobile. They finally had to bow to the horseless carriage.

It perhaps is true that the early tractors were somewhat lacking in necessary essentials, but the rapid development of this industry has brought many changes and improvements. It is stated authoritatively that one tractor manufacturer built and experimented with sixty-three different models of tractors, covering a period of years, before he put one on the market. This same manufacturer insisted that the tools which this tractor should pull should be so constructed that they could be operated from the driver's seat, obviating the necessity of having an extra man accompany the tractor to operate the tools. That this latter idea was logical is borne out by the fact that today several of the largest manufacturers are making tools exclusively for use with the tractor. This is an illustration of how tractor and implement men are endeavoring to eliminate the manual labor in tilling the soil.

The different colleges of agriculture are strongly urging the use of power farming machinery, which opinion has been reached after exhausting study and experiments with the modern methods. It has been clearly proven that a horse consumes as much food in a year as

can be raised on a four or five acre lot, which might otherwise be used for a productive crop. In the off season a tractor and its belt power can perform multitudinous duties on a ranch, while the horse must remain idle, demanding, however, the same attention as if he were working.

Looked at from every angle, a new era has dawned for the "man with the hoe," and in a few years one will look back upon the present times and wonder how it was at all possible for the rancher to produce the food that feeds the world.

DEEP TILLAGE.

By GEORGE A. FLOOD, of the Killefer Manufacturing Company.

There are three general classes which include all tillage operations:

- (1) *Cultivation*, which operation either turns or stirs the soil to a depth of from four to six inches.
- (2) *Chiseling*, which operation breaks the soil to a depth of from six to fifteen inches, but does not turn it.
- (3) *Subsoiling*, which is merely a deep chiselling operation, breaking the ground normally to a depth of twenty-four inches, and in certain instances even to a depth of forty-eight inches.

Before the advent of the tractor, California farmers developed the habit of shallow plowing. The presence of salts, alkali, potash and other minerals in the soil, coupled with this shallow plowing year after year at practically the same depth, produced a mechanical condition, generally known as plow sole or plow pan.

This plow pan, although frequently referred to as mechanical hard pan, should not be confused with natural hard pan, which is that strata of hard, densely packed earth found on the western slope of the Sierra Nevada Mountains, extending down to the Sacramento and San Joaquin rivers practically the whole length of the valley district, at a depth varying from the surface of the land to forty feet beneath, and of varying degrees of thickness, from a thin crust to many feet.

However, so far as crop production is concerned, the effects of plow sole and hard pan are the same. Both must be destroyed before proper cultivation can be had, and the only difference in the two that will be considered here is in the method required for their destruction.

Plow sole offers less resistance to the available methods of breaking it up than hard pan, and, with the tractor and tool of sufficient strength now available for tractor use, it can be broken up and subdued, bringing the land back to the point where a full yield may be expected.

Plow sole offers less resistance to tillage implements than does hard pan; both are in many cases impervious to horse teams and ordinary plows, and in some instances are difficult of handling with tractors and modern implements. Yet before a full yield may be expected this condition must be subdued and to date the only satisfactory means is by use of the chisel or subsoiler.

To break up this hard strata it is necessary to get beneath it, and, where it is possible to satisfactorily use the ordinary plow, the soil is turned over so that the closely packed portion is on top. This portion is impervious to the elements, to the penetration of vegetable roots, and therefore devoid of humus, without which there can be no germination.

Soil handled in this manner must therefore be left idle for from one to three years that nature may rejuvenate this cold inert strata brought to the surface, and which farmers have found almost totally unproductive.

The problem then resolves itself into the breaking up of this hard pan without turning it over, and sufficient power and a tool so designed that it will break and loosen the soil to a depth of twelve to fifteen inches, which will break most cases of plow sole, is necessary.

Farmers who have asserted that the grain lands of the state, which in past years were so productive, are worn out, have, after proper cultivation, with proper tools, seen that the land is not worn out but that the old method of continual shallow plowing and cultivation has shut out the elements so necessary for plant germination.

Where hard pan lies close to the surface, there can be no crop production, as the thin strata of soil above it can not maintain sufficient moisture to nurture a crop to maturity; and, where grain is attempted under these conditions, it is always a failure unless rain falls at frequent intervals.

This natural hard pan is found in varying degrees in those sections where we find what is commonly known as hog wallow. In this kind of land the knolls are hard, thereby rapidly shedding the rainfall, which collects in ponds of greater or less extent between them, drowning the young grain that may have previously sprouted.

The farmer, in order to save his crop, resorts to what is known as surface drainage, running a furrow through the low places and leading the water off into some natural channel, thereby allowing it to get away instead of loosening all the surface of his land and allowing this water to percolate into the ground where nature intended it to nourish the crop.

The man who resorts to this method of farming is robbing himself; is stealing from his own pocket.

To exemplify this, suppose a reservoir is built in a field. In it put a concrete floor which represents plow pan, plow sole, or natural hard pan, as the case may be.

Put a four-inch concrete rim around it. This four inches represents the depth of cultivation on the average California grain farm.

Assuming an average rainfall of 15 inches a season, it is obvious that 11 inches of this rainfall would overflow the reservoir and run off.

Plant growth is made possible by the capillary action of the roots in drawing moisture from the soil, which moisture gathers substance to produce this growth.

It is a fact, then, that soil tillage is simply a means of building a seasonable reservoir whose capacity is in direct proportion to its depth.

Had California attempted to remain chiefly a grain growing state, we probably still would be following the old method, but the sugar

industry, which promised large returns, attracted to the state men who were forced to deep cultivation in order to produce the sugar beet. To this industry and the bean industry, which requires deep cultivation, we owe most of our knowledge of deep tillage.

It was only a few years ago that Ventura County produced nothing but hay and grain, the farmers eking out a meager existence, plowing their ground a few inches deep, planting their crop and trusting to luck. When they had a sufficiently wet winter they were fairly successful. When the dry years came, they were bankrupt, but by watching the beet men with their deep tillage methods they got the idea of deep tillage and slowly learned its effects, until today they are breaking their ground for beans as deep as the beet producer is breaking his, and regardless of the season's rainfall, they produce a splendid crop of beans.

There appeared in a recent issue of the "Implement Record" an interesting explanation of the method used by a successful farmer in operating deep tillage tools, and the results he obtained under California conditions, and from this article the following extracts are taken:

Subsoiling on adobe land in the fall of a dry year, when the ground is at its hardest, and the plow sole has formed a solid floor, impenetrable to water from above or beneath—that is the solution of hard-pan farming which a land company has found effective on its 2000-acre tract in the Sacramento Valley, California.

The land on which this experiment resulted in so conclusively successful a solution has been planted in rice for three years, and it was desired to rotate this rice crop with one of early Bart wheat. Superintendent John G. Beekler, of the property, had found, however, that with any amount of rain at all, his crop would drown and wash out, and that without almost constant rain, the stand would be stunted by drought which irrigation could not entirely prevent.

SOIL'S POROSITY DESTROYED.

The porosity of the soil was destroyed. There was no penetration, no filtration of the water into the ground. As a consequence of forty years of uniform plowing, there was created a deposit known as the plow sole, commonly termed the invisible alkali of the California adobe.

The soil first had to be put into a condition to accept a maximum of moisture, which made necessary the destruction of the plow sole. This was accomplished by the chiseling of the ground while dry—not wet. The crop was produced without a single plow furrow. A plow would not penetrate this hard flooring.

On penetrating with the chisel, Mr. Beekler found the soil compared with slate, having been plowed at the same depth for many years and hydrauliced with water for the last three years.

GIANT LOAD FOR 75 H. P. TRACTOR.

"The chisel," explained Beekler, "is a giant tool, much like the oldtime spike-tooth cultivator, only greatly magnified. It consists of seventeen standards, to which are attached seventeen chisels at an angle of forty-five degrees.

"These chisels may be run below the ground at any desired depth, but in the instance of the ranch, they were sunk sufficiently to disturb the ground to the depth of fourteen inches, thus destroying the plow sole. The instrument is a load for a 75-horsepower tractor.

"When the land is broken up, the water is permitted to store above the native hard pan, which is several feet below the ground, and is made available for the slacking of the thirst of the wheat during summer. As the tap root of wheat will penetrate a foot into the ground, this penetration is permitted by the destruction of the plow sole, and the root is able to reach the moisture.

ON WET YEARS.

"This takes care of the dry year. Now, for the wet year, which the adobe farmer so dreads. First, the breaking of the plowsole admits rain water to the great natural reservoir. Second, cross-section the field with a series of ditches; in some following natural depressions, and others excavating new ditches, according to the topography. Now, the plowsole having been broken, the rain water is admitted to the subsurface, and the surplus escapes off into the ditches.

DUG DITCHES IN AUGUST.

"We dug our ditches last August, after chiseling, when the ground was apparently bone dry, yet the moment the excavations were opened the water flowed out from under the plowsole, and has continued to do so until the present time. Unbelievable as the fact may seem to experienced adobe farmers, there is still moving water in these ditches.

"During the last heavy rains this field was conspicuous for the absence of standing water in it. What wasn't absorbed by the soil below the plowsole ran off into the ditches, and as a consequence the growing crop was not drowned out."

SUMMARY OF THE SCHEME.

In a nutshell, here was Beekler's plan: Chisel the ground, while dry, in June, July or August, in the year following a rice crop, which treatment gives the land a season's rest, which compares to summer fallowing; excavate ditches; disc harrow after the first rain, and drill in the seed.

Under the new system of treatment of this soil, forty inches of rain won't drown out the wheat on the adobe, and in a dry year the same principle of water storage is applied to adobe wheat land as is natural with alluvial orchard land.

DISC PLOWING WITH TRACTORS.

By JOHN H. DAVIS, Plow Expert, The Holt Manufacturing Co.

Disc plowing is rapidly becoming more popular with all who use tractors for motive power. Moldboard plows, which have been used in all countries for many centuries, in one form or another, are favored more as a matter of habit than because of any particular advantages they possess. A brief study will show many points in favor of disc plows and disc plowing.

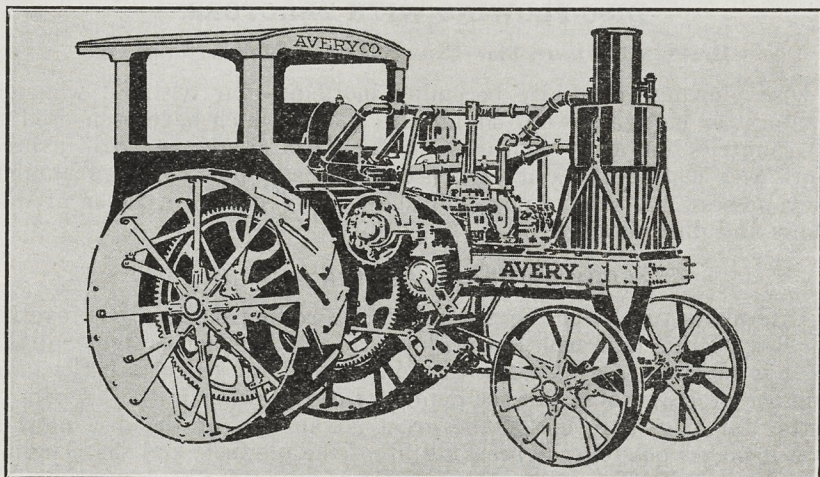
LIGHTER DRAFT, BETTER PLOWING.

Disc plows turn over the ground with a rolling motion that involves far less friction than moldboard plows cause. This makes lighter draft, so it is possible to pull a greater width of plows, or to pull the same number of plows at a greater depth. Deep plowing is the keynote of better farming, and one of the great advantages of the disc plow is that it makes possible the breaking up of the plowsole and the bringing up of new, hitherto unavailable sources of plant food.

The rolling motion of the discs turns the soil without packing the bottom of the furrow, leaving it loose and in best condition for absorbing moisture, allowing the roots to penetrate to the proper depth. Moreover, instead of simply turning over the furrow and leaving the ground in such shape that it has to be harrowed immediately, the disc plow pulverizes the soil thoroughly, making a perfect, mellow seed bed.

FOR ALL LAND, ANY WEATHER.

Disc plows can be used with perfect success in any soil, even the hardest dry adobe or the toughest virgin soil. With a disc plow, there is no need of waiting for rain to soften the ground—you can prepare your ground at your own convenience or at just the proper time.



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Factory: Peoria, Illinois.

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Dealers in most towns

SPECIFICATIONS.

Trade name—MODEL B AVERY 5/10.

Where made—PEORIA, ILL.

Type—WHEEL.

H. P. draw bar—5.

H. P. belt—10.

Normal pull in pounds—

Low gear.

Intermediate.

High gear.

Length, inches—135.

Width, inches—50.

Height—54".

Outside turning radius, feet—10½.

Weight with full equipment—2800.

Shipping weight—2600.

Number of wheels—4.

Diameter, drive wheels—38".

Diameter, other wheels—28".

Width of face of drive wheels—10".

Other wheels—5".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—AVERY.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—4.

Bore—3". Stroke—4".

Normal revolutions per minute—1200.

Number of crank shaft bearings—3.

Front—3¼".

Middle—3¼".

Rear—2¾".

Diameter of crank shaft—1¾".

Total length of crank shaft bearings—87".

Length of connecting-rod bearings—1½".

Number of piston rings for piston—3.

Fuel recommended—GAS., DIST.

Make of carburetor—KINGSTON.

Size of carburetor—1".

Capacity of priming tank—NONE.

Capacity of fuel tank—11 gallons.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED.

Type of oil pump—GEAR.

Make of lubricator—AVERY.

Oil circulating indicator in driver's vision—

YES

Type of radiator—TUBULAR.

Water circulation—THERMO SYPHON.

Fan drive—GEAR.

Ignition—MAGNETO and IMPULSE

STARTER

Make of ignition system—K. W.

Type of governor—FLY-BALL.

Diameter of belt pulley—10".

Width of face of belt pulley—5¼" face.

R. P. M. of belt pulley—800.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—SIDE.

Transmission clutch—DRY PLATE,

MULTIPLE DISK

Final drive clutches.

Transmission system—SELECTIVE.

Miles per hour: Low—1½.

Intermediate—2½.

High—4½.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—STEEL (CHROME-NICKEL).

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—HYATT ROLLER.

Differential.

Rear axle—HYATT ROLLER.

Front axle—PLAIN.

Fan—ROLLER.

Pulley.

Road clearance—10".

Price F.O.B. Los Angeles—\$775.

San Francisco—\$775.

SPECIFICATIONS.

Trade name—AVERY.
Where made—PEORIA, ILL.

Type—WHEEL.

H. P. draw bar—7.

H. P. belt—14.

Normal pull in pounds—

Low gear.

Intermediate.

High gear.

Length, inches—138.

Width, inches—60.

Height—54".

Outside turning radius, feet—10½.

Weight with full equipment—3000.

Shipping weight—2800.

Number of wheels—4.

Diameter, drive wheels—38".

Diameter, other wheels—28".

Width of face of drive wheels—10".

Other wheels—5".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—AVERY.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—6.

Bore—3". Stroke—4".

Normal revolutions per minute—1200.

Number of crank shaft bearings—3.

Front—3¼".

Middle—3¼".

Rear—2¾".

Diameter of crank shaft—1¾".

Total length of crank shaft bearings—8¾".

Length of connecting-rod bearings—1½".

Number of piston rings for piston—3.

Fuel recommended—GAS, DISTILLATE.

Make of carburetor—KINGSTON.

Size of carburetor—1".

Capacity of fuel tank—11 gallons.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED and SPLASH
CIRCULATING

Type of oil pump—GEAR.

Make of lubricator—AVERY.

Oil circulating indicator in driver's vision—

YES

Type of radiator—HONEYCOMB.

Water circulation—THERMO SYPHON.

Fan drive—GEAR.

Ignition—MAGNETO.

Make of ignition system—K. W. H. T.

Type of governor—CENTRIFUGAL TYPE.

Self-starter.

Diameter of belt pulley—10".

Width of face of belt pulley—5¼".

R. P. M. of belt pulley—800.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—SIDE.

Transmission clutch—DRY PLATE,

MULTIPLE DISK

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1.

Intermediate—2½.

High—4½.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—CHROME-NICKEL STEEL.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—HYATT ROLLER.

Differential—HYATT ROLLER.

Rear axle—HYATT ROLLER.

Front axle—PLAIN.

Fan—ROLLER.

Pulley.

Road clearance—10".

Price F.O.B. factory.

Price F.O.B. Los Angeles.

San Francisco.

Sacramento.

Fresno.

SPECIFICATIONS.

Trade name—AVERY 8/16 H. P.

Where made—PEORIA, ILL.

Type—WHEEL.

H. P. draw bar—8.

H. P. belt—16.

Normal pull in pounds.

Low gear—1750.

Intermediate.

High gear.

Length, inches—130.

Width, inches—56.

Height—73".

Outside turning radius, feet.

Weight with full equipment—5250.

Shipping weight—4900.

Number of wheels—4.

Diameter, drive wheels—50".

Diameter, other wheels—30".

Width of face of drive wheels—12".

Other wheels—5".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—AVERY.

Type—HORIZONTAL.

Type of head—VALVE IN HEAD.

Number of cylinders—2.

Bore—5½". Stroke—6".

Normal revolutions per minute—600.

Number of crank shaft bearings—2.

Front—5 1/16".

Middle.

Rear—5¾".

Diameter of crank shaft—2¾".

Total length of crank shaft bearings—

10 13/16"

Length of connecting-rod bearing.

Number of piston rings for piston—5.

Fuel recommended—DIST., KER.

Make of carburetor—KINGSTON.

Size of carburetor.

Capacity of priming tank—2¼ gallons.

Capacity of fuel tank—13¼ gallons.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED and SPLASH.

Type of oil pump—GEAR.

Make of lubricator—AVERY.

Oil circulating indicator in driver's vision—

YES

Type of radiator—TUBULAR.

Water circulation—THERMO SYPHON.

Fan drive—NONE.

Ignition—MAGNETO and IMPULSE

STARTER

Make of ignition system—K. W.

Type of governor—FLY BALL.

Diameter of belt pulley—17¼".

Width of face of belt pulley—7".

R. P. M. of belt pulley—600.

Belt speed in feet per minute.

Pulley drive—DIRECT.

Location of belt pulley—SIDE.

Transmission clutch—INTERNAL

EXPANDING SHOE

Final drive clutches.

Transmission system—SLIDING FRAME.

Miles per hour: Low—1¾".

Intermediate.

High—3.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—STEEL.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—PLAIN.

Differential—PLAIN.

Rear axle—PLAIN.

Front axle.

Fan.

Pulley.

Road clearance.

Price F.O.B. Los Angeles—\$1050.

San Francisco—\$1050.

SPECIFICATIONS.

Trade name—AVERY 12/25.
Where made—PEORIA, ILL.
Type—WHEEL.

H. P. draw bar—12.

H. P. belt—25.

Normal pull in pounds—

Low gear—2575.

Intermediate.

High gear.

Length, inches—164".

Width, inches—80".

Height—105".

Outside turning radius, feet.

Weight with full equipment—7800.

Shipping weight 7500.

Number of wheels—4.

Diameter, drive wheels—56".

Diameter, other wheels—30".

Width of face of drive wheels—20".

Other wheels—8".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—AVERY.

Type—HORIZONTAL.

Type of head—VALVE IN HEAD.

Number of cylinders—2.

Bore—6 $\frac{1}{2}$ ". Stroke—7".

Normal revolutions per minute—570.

Number of crank shaft bearings—2.

Front—6".

Rear—7 $\frac{1}{4}$ ".

Diameter of crank shaft—3 $\frac{3}{4}$ ".

Total length of crank shaft bearings—13 $\frac{1}{4}$ ".

Length of connecting-rod bearing.

Number of piston rings for piston—5.

Fuel recommended—DIST., KER.

Make of carburetor—DUAL KINGSTON.

Size of carburetor.

Capacity of priming tank—3 $\frac{3}{4}$ GALS.

Capacity of fuel tank—20 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED.

Type of oil pump—GEAR.

Make of lubricator—AVERY.

Oil circulating indicator in driver's vision—

YES.

Type of radiator—TUBULAR.

Water circulation—THERMO SYPHON.

Fan drive.

Ignition—MAGNETO AND IMPULSE

STARTER.

Make of ignition system—K. W.

Type of governor—FLY-BALL.

Self-starter.

Diameter of belt pulley—19 $\frac{1}{2}$ ".

Width of face of belt pulley—7".

R.P.M. of belt pulley—570.

Belt speed in feet per minute.

Pulley drive—DIRECT.

Location of belt pulley—END OF CRANK

SHAFT.

Transmission clutch—EXPANDING BAND.

Final drive clutches.

Transmission system—SLIDING FRAME.

Miles per hour: Low—1 $\frac{3}{4}$.

High—2 $\frac{3}{4}$.

Final drive—SPUR GEAR.

Final drive—OPEN.

Gear metal—STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—PLAIN.

Differential—PLAIN.

Rear axle—PLAIN.

Front axle—PLAIN.

Fan—NONE.

Pulley—NONE.

Road clearance—11".

Price F.O.B. Los Angeles—\$1450.

San Francisco—\$1450.

SPECIFICATIONS.

Trade name—AVERY 14/28.	Capacity of fuel tank—20 gallons.
Where made—PEORIA, ILL.	Make and type of air cleaner—BENNETT.
Type—WHEEL.	Lubrication—FORCE FEED and SPLASH CIRCULATING
H. P. draw bar—14.	Type of oil pump—GEAR.
H. P. belt—28.	Make of lubricator—AVERY.
Normal pull in pounds—	Oil circulating indicator in driver's vision— YES
Low gear—2285.	
Intermediate.	
High gear.	Type of radiator—TUBULAR.
Length, inches—152.	Water circulation—THERMO SYPHON.
Width, inches—68.	Ignition—MAGNETO and IMPULSE STARTER
Height—104".	Make of ignition system—K. W. H. T.
Outside turning radius, feet.	Type of governor—CENTRIFUGAL.
Weight with full equipment—7400.	Diameter of belt pulley—16".
Shipping weight—6800.	Width of face of belt pulley—7½".
Number of wheels—4.	R. P. M. of belt pulley—700.
Diameter, drive wheels—60".	Belt speed in feet per minute.
Diameter, other wheels—36".	Pulley drive—DIRECT.
Width of face of drive wheels—12".	Location of belt pulley—REAR.
Other wheels—6".	Transmission clutch—EXPANDING SHOE.
Number of tracks.	Final drive clutches.
Width of tracks.	Transmission system—SLIDING FRAME.
Length of track on ground.	Miles per hour: Low—2½.
Motor—AVERY.	Intermediate.
Type—HORIZONTAL.	High—3½.
Type of head—VALVE IN HEAD.	Final drive—GEAR.
Number of cylinders—4.	Final drive—OPEN.
Bore—4½. Stroke—7.	Gear metal—STEEL.
Normal revolutions per minute—700.	BEARINGS—Ball, Roller, Plain or Oilless
Number of crank shaft bearings—2.	Transmission—PLAIN.
Front—5½".	Differential—PLAIN.
Middle.	Rear axle—PLAIN.
Rear—5½".	Front axle—PLAIN.
Diameter of crank shaft—3".	Fan—NO.
Total length of crank shaft bearings—11".	Pulley—NO.
Length of connecting-rod bearing.	Road clearance—15".
Number of piston rings for piston—5.	Price F.O.B. factory.
Fuel recommended—DIST., KER.	Price F.O.B. Los Angeles—\$1980.
Make of carburetor—DUAL KINGSTON.	San Francisco—\$1980.
Size of carburetor.	
Capacity of priming tank—3½ gallons.	

SPECIFICATIONS.

Trade name—AVERY 18/36.
 Where made—PEORIA, ILL.
 Type—WHEEL.
 H. P. draw bar—18.
 H. P. belt—36.
 Normal pull in pounds—
 Low gear—3375.
 Intermediate.
 High gear.
 Length, inches—152.
 Width, inches—84.
 Height—105".
 Outside turning radius, feet.
 Weight with full equipment—9300.
 Shipping weight—9250.
 Number of wheels—4.
 Diameter, drive wheels—65".
 Diameter, other wheels—35".
 Width of face of drive wheels—20".
 Other wheels—8".
 Number of tracks.
 Width of tracks.
 Length of track on ground.
 Motor—AVERY.
 Type—HORIZONTAL.
 Type of head—VALVE IN HEAD.
 Number of cylinders—4.
 Bore—5½". Stroke—6".
 Normal revolutions per minute—650.
 Number of crank shaft bearings—2.
 Front—5½".
 Middle.
 Rear—7¼".
 Diameter of crank shaft—3½".
 Length of crank shaft bearings—12¾".
 Length of connecting-rod bearing.
 Number of piston rings for piston—5.
 Fuel recommended—DIST., KER.
 Make of carburetor—DUAL KINGSTON.
 Size of carburetor.
 Capacity of priming tank—5½ GALS.

Capacity of fuel tank—34 GALS.
 Make and type of air cleaner—BENNETT.
 Lubrication—FORCE.
 Type of oil pump—GEAR.
 Make of lubricator—AVERY.
 Oil circulating indicator in driver's vision—
 YES.
 Type of radiator—Tubular.
 Water circulation—THERMO SYPHON.
 Fan drive.
 Ignition—MAGNETO AND IMPULSE
 STARTER.
 Make of ignition system—K. W.
 Type of governor—FLY BALL.
 Diameter of belt pulley—18".
 Width of face of belt pulley—8".
 R. P. M. of belt pulley—650.
 Belt speed in feet per minute.
 Pulley drive—DIRECT.
 Location of belt pulley—END OF CRANK
 SHAFT.
 Transmission clutch—EXPANDING SHOE.
 Final drive clutches.
 Transmission system—SLIDING FRAME.
 Miles per hour: Low—2.
 Intermediate.
 High—3.
 Final drive—GEAR.
 Final drive—OPEN.
 Gear metal—STEEL.
 BEARINGS—Ball, Roller, Plain or Oilless.
 Transmission—PLAIN.
 Differential—PLAIN.
 Rear axle—PLAIN.
 Front axle—PLAIN.
 Fan—NONE.
 Pulley—NONE.
 Road clearance—15".
 Price F.O.B. Los Angeles—\$2700.
 San Francisco—\$2700.

SPECIFICATIONS.

Trade name—AVERY 25/50.	Capacity of fuel tank—34 GALS.
Where made—PEORIA, ILL.	Make and type of air cleaner—BENNETT.
Type—WHEEL.	Lubrication—FORCE FEED and SPLASH CIRCULATING.
H. P. draw bar—25.	Type of oil pump—GEAR.
H. P. belt—50.	Make of lubricator—AVERY.
Normal pull in pounds—	Oil circulating indicator in driver's vision— YES.
Low gear—4690.	
Intermediate.	
High gear.	Type of radiator—TUBULAR.
Length, inches—176".	Water circulation—THERMO SYPHON.
Width, inches—90½".	Fan drive.
Height—108".	Ignition—MAGNETO AND IMPULSE STARTER.
Outside turning radius, feet.	Make of ignition system—K. W. H. T.
Weight with full equipment—13,000.	Type of governor—CENTRIFUGAL.
Shipping weight—12,500.	Diameter of belt pulley—22".
Number of wheels—4.	Width of face of belt pulley—8½".
Diameter, drive wheels—63".	R.P.M. of belt pulley—500.
Diameter, other wheels—38".	Belt speed in feet per minute.
Width of face of drive wheels—20".	Pulley drive—DIRECT.
Other wheels—10".	Location of belt pulley—END CRANK SHAFT.
Number of tracks.	Transmission clutch—EXPANDING SHOE.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING FRAME.
Motor—AVERY.	Miles per hour: Low—2.
Type—HORIZONTAL.	Intermediate.
Type of head—VALVE IN HEAD.	High—3.
Number of cylinders—4.	Final drive—SPUR GEAR.
Bore—6½". Stroke—7".	Final drive—OPEN.
Normal revolutions per minute—500.	Gear metal—STEEL.
Number of crank shaft bearings—2.	BEARINGS—Ball, Roller, Plain or Oilless.
Front—6¾".	Transmission—PLAIN.
Middle.	Differential—PLAIN.
Rear—7½".	Rear axle—PLAIN.
Diameter of crank shaft—3¾".	Front axle—PLAIN.
Total length of crank shaft bearings—14¾".	Fan—NONE.
Length of connecting-rod bearing.	Pulley—NONE.
Number of piston rings for piston—5.	Road clearance—15".
Fuel recommended—DIST., KER.	Price F.O.B. Los Angeles—\$3700.
Make of carburetor—DUAL KINGSTON.	San Francisco—\$3700.
Size of carburetor.	
Capacity of priming tank—5½ GALS.	

SPECIFICATIONS.

Trade name—AVERY 40/80.	Make and type of air cleaner—BENNETT.
Where made—PEORIA, ILL.	Lubrication—FORCE FEED.
Type—WHEEL.	Type of oil pump—GEAR.
H. P. draw bar—40.	Make of lubricator—AVERY.
H. P. belt—80.	Oil circulating indicator in driver's vision— YES.
Normal pull in pounds—	
Low gear—8575.	Type of radiator—TUBULAR.
Intermediate.	Water circulation—THERMO SYPHON.
High gear.	Fan drive.
Length, inches—215".	Ignition—MAGNETO AND IMPULSE STARTER.
Width, inches—111½".	Make of ignition system—K. W. H. T.
Height—121".	Type of governor—CENTRIFUGAL.
Outside turning radius, feet.	Self-starter—YES.
Weight with full equipment—22,500.	Diameter of belt pulley—26".
Shipping weight—22,000.	Width of face of belt pulley—10".
Number of wheels—4.	R.P.M. of belt pulley—500.
Diameter, drive wheels—87½".	Belt speed in feet per minute.
Diameter, other wheels—42".	Pulley drive—DIRECT.
Width of face of drive wheels—24".	Location of belt pulley—END CRANK
Other wheels—16".	Transmission clutch—EXPANDING BAND.
Number of tracks.	Final drive clutches.
Width of tracks.	Transmission system—SLIDING FRAME.
Length of track on ground.	Miles per hour: Low—1½.
Motor—AVERY.	High—2½.
Type—HORIZONTAL.	Final drive—SPUR GEAR.
Type of head—VALVE IN HEAD.	Final drive—OPEN.
Number of cylinders—4.	Gear metal—STEEL.
Bore—7¾". Stroke—8".	BEARINGS—Ball, Roller, Plain or Oilless.
Normal revolutions per minute—500.	Transmission—PLAIN.
Number of crank shaft bearings—2.	Differential—PLAIN.
Front—9".	Rear axle—PLAIN.
Rear—9".	Front axle—PLAIN.
Diameter of crank shaft—4½".	Fan—NONE.
Total length of crank shaft bearings—18".	Pulley—NONE.
Length of connecting-rod bearing.	Road clearance—17".
Number of piston rings for piston—5.	Price F.O.B. Los Angeles—\$4500.
Fuel recommended—DIST., KER.	San Francisco—\$4500.
Make of carburetor—DUAL KINGSTON.	
Size of carburetor.	
Capacity of priming tank—5½ GALS.	
Capacity of fuel tank—45 GALS.	

SPECIFICATIONS.

Trade name—AVERY MOT. CULT.

Where made—PEORIA, ILL.

Type—WHEEL.

H. P. draw bar—5.

H. P. belt—10.

Normal pull in pounds—

Low gear.

Intermediate.

High gear.

Length, inches.

Width, inches—60", 70", 80", 93".

Height.

Weight with full equipment—3200.

Shipping weight—3050.

Number of and location of wheels—3 or 4.

Diameter, drive wheels—42".

Diameter, other wheels—28".

Width of face of drive wheels—6".

Other wheels—5".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—AVERY.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—3". Stroke—4".

Normal revolutions per minute—950.

Number of crank shaft bearings—3.

Front—3½".

Middle—3½".

Rear—2½".

Diameter of crank shaft—1¾".

Total length of crank shaft bearings—9½".

Length of connecting-rod bearing—1½".

Number of piston rings for piston—3.

Fuel recommended—GAS, DIST.

Make of carburetor—KINGSTON.

Size of carburetor—1".

Capacity of priming tank—NONE.

Capacity of fuel tank—11 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED AND SPLASH.

Type of oil pump—GEAR.

Make of lubricator—AVERY.

Oil circulating indicator in driver's vision—

YES.

Type of radiator—TUBULAR.

Water circulation—THERMO SYPHON.

Fan drive—GEAR.

Ignition—MAGNETO AND IMPULSE

STARTER.

Make of ignition system—K. W. H. T.

Type of governor—FLY-BALL.

Self-starter.

Diameter of belt pulley—10".

Width of face of belt pulley—5¼".

R.P.M. of belt pulley—800.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—SIDE.

Transmission clutch—DRY PLATE, MULTI-

PLE DISK.

Final drive clutches.

Transmission system—SELECTIVE.

Miles per hour: Low—1½.

Intermediate—2½.

High—4½.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—STEEL (CHROME NICKEL).

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—HYATT ROLLER.

Differential—HYATT ROLLER.

Front axle—PLAIN.

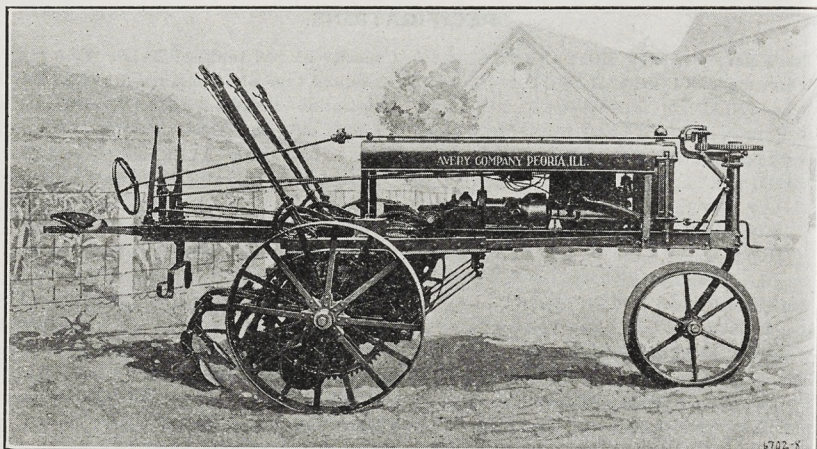
Fan—ROLLER.

Pulley.

Road clearance—30".

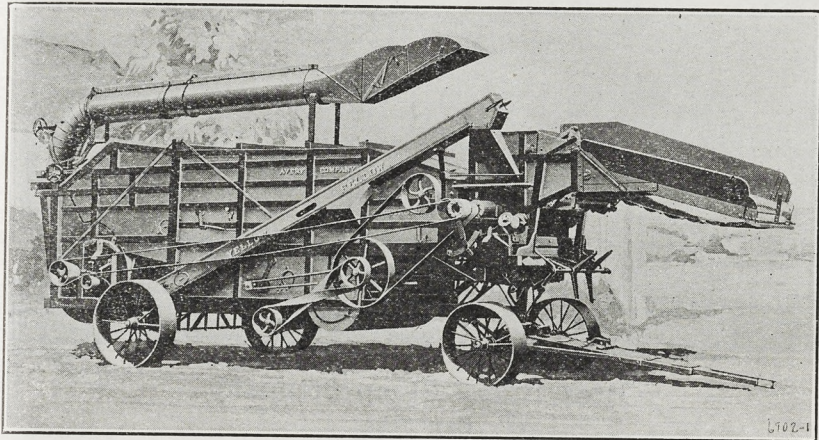
Price F.O.B. Los Angeles—\$775.

San Francisco—\$775.



SPECIFICATIONS.

- Trade name—AVERY MOTOR CULTIVATOR. Make and type of air cleaner—BENNETT.
 Where made—PEORIA, ILL. Lubrication—FORCE FEED and SPLASH
 Type—WHEEL. CIRCULATING
 H. P. draw bar—7. Type of oil pump—GEAR.
 H. P. belt—14. Make of lubricator—AVERY.
 Normal pull in pounds— Oil circulating indicator in driver's vision—
 Low gear. YES
 Intermediate.
 High gear.
 Length, inches—184. Type of radiator—HONEYCOMB.
 Width, inches—60-70-80-93. Water circulation—THERMO SYPHON.
 Height. Fan drive—GEAR.
 Outside turning radius, feet. Ignition—MAGNETO.
 Weight with full equipment—3200. Make of ignition system—K. W. H. T.
 Shipping weight—3050. Type of governor—CENTRIFUGAL TYPE.
 Number of wheels—3 or 4. Self-starter.
 Diameter, drive wheels—42". Diameter of belt pulley—10".
 Diameter, other wheels—28". Width of face of belt pulley—5 1/2".
 Width of face of drive wheels—6". R. P. M. of belt pulley—800.
 Other wheels—5". Belt speed in feet per minute.
 Number of tracks. Pulley drive—GEAR.
 Width of tracks. Location of belt pulley—SIDE.
 Length of track on ground. Transmission clutch—DRY PLATE,
 Motor—AVERY. MULTIPLE DISK
 Type—VERTICAL. Final drive clutches.
 Type of head—"L". Transmission system—SLIDING GEAR.
 Number of cylinders—6. Miles per hour: Low—1.
 Bore—3". Stroke—4". Intermediate—2 1/2.
 High—4 1/2.
 Normal revolutions per minute—1200. Final drive—GEAR.
 Number of crank shaft bearings—3. Final drive—OPEN.
 Front—3 1/4". Gear metal—CHROME-NICKEL STEEL.
 Middle—3 1/4". BEARINGS—Ball, Roller, Plain or Oilless
 Rear—2 3/4". Transmission—HYATT ROLLER.
 Diameter of crank shaft—1 1/2". Differential—HYATT ROLLER.
 Total length of crank shaft bearings—8 3/4". Rear axle—HYATT ROLLER.
 Length of connecting-rod bearing—1 1/4". Front axle—PLAIN.
 Number of piston rings for piston—3. Fan—ROLLER.
 Fuel recommended—GAS, DISTILLATE. Pulley.
 Make of carburetor. Road clearance—30".
 Size of carburetor—1". Price F.O.B. factory.
 Capacity of fuel tank—11 gallons. Price F.O.B. Los Angeles—\$950.
 San Francisco—\$950.

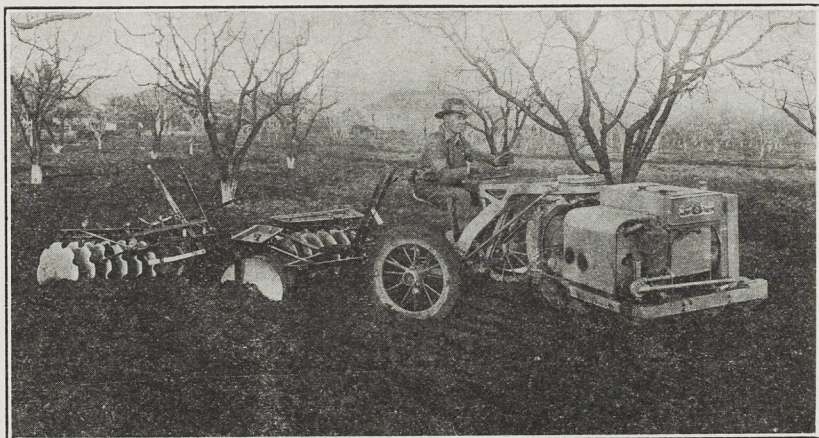


Threshing Machines

Avery Company of the Pacific Coast

SPECIFICATIONS.

1. Width of cylinder-----	20"	24"	28"	32"	36"	42"	42"
2. Width of separator-----	30"	36"	46"	54"	60"	64"	70"
3. Cylinder pulley diameter---	9½"	9½"	10"	10"	11"	11"	11"
4. Pulley face -----	7½"	7½"	8½"	8½"	9½"	9½"	9½"
5. Pulley speed in R.P.M.-----	1200	1200	1200	1200	1200	1200	1200
6. Horsepower with SF and WS required (approximate) --	16	16	36	50	75 to 80	80	80
7. Capacity in bushels per hour--							
Wheat -----	80	100	130	200	250	275	300
Oats -----	---	---	---	---	---	---	---
Rice (sacks) -----	60	70	90	150	175	200	225
8. Over all dimensions (on road)	---	---	---	---	---	---	---
9. Weight, fully equipped-----	7100#	7428#	9180#	10,180#	10,820#	11,420#	11,640#



Bean Spray Pump Company San Jose

Los Angeles

Fresno

BEAN TRACK PULL TRACTOR
BEAN SPRAY PUMPS
BEAN IRRIGATING PUMPS

SPECIFICATIONS.

Trade name—BEAN TRACKPULL.
Where made—SAN JOSE, CALIF.
Type—TRACK.
H. P. draw bar—6.
H. P. belt—10.

Normal pull in pounds—

Low gear.
Intermediate.
High gear.

Length, inches—102.

Width, inches—60.

Height—44".

Outside turning radius, feet—6.

Weight with full equipment—3200.

Shipping weight—3200.

Number of wheels—2 IN REAR.

Diameter, drive wheels.

Diameter, other wheels—24".

Width of face of drive wheels.

Other wheels—6".

Number of tracks—1.

Width of tracks—12".

Length of track on ground—32".

Motor—LE ROI.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—3 $\frac{3}{8}$ ". Stroke—4 $\frac{1}{4}$ ".

Normal revolutions per minute—1200.

Number of crank shaft bearings—2.

Front—3".

Middle.

Rear—3".

Diameter of crank shaft—1 $\frac{3}{4}$ ".

Total length of crank shaft bearings—6".

Length of connecting-rod bearing—2".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—MAYER.

Size of carburetor—1".

Capacity of priming tank— $\frac{1}{4}$ GAL.

Capacity of fuel tank—13 GALS.

Make and type of air cleaner—DONALDSON.

Lubrication—SPLASH CIRCULATING.

Type of oil pump—PLUNGER.

Make of lubricator.

Oil circulating indicator in driver's vision—
YES.

Type of radiator—CELLULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO.

Make of ignition system—BOSCH.

Type of governor—FLY-BALL.

Self-starter—NO.

Diameter of belt pulley—12".

Width of face of belt pulley—5".

R.P.M. of belt pulley—600.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—ON SIDE.

Transmission clutch—CONE.

Final drive clutches.

Transmission system.

Miles per hour: Low—2.

Intermediate.

High.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—20 TO 30 CARBON STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—BALL.

Rear axle—PLAIN.

Front axle—HYATT ROLLER.

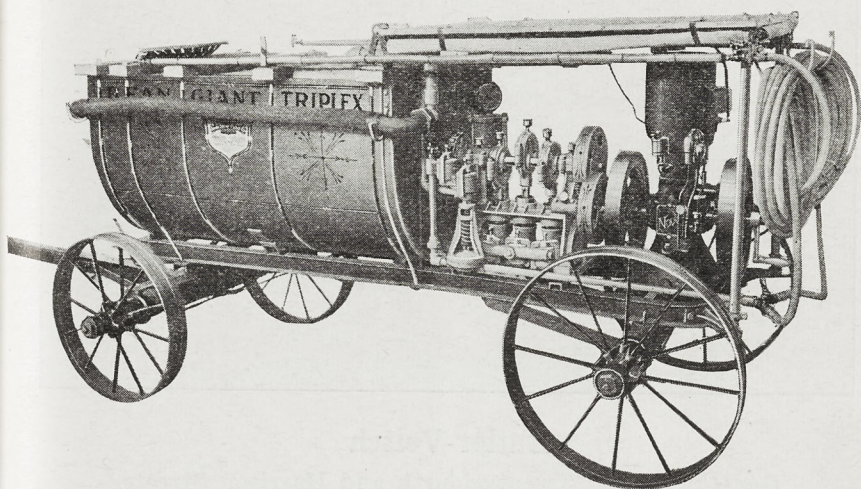
Fan—BALL.

Pulley—BALL.

Road clearance—9".

Price F.O.B. factory—\$1375.

Price F.O.B. Los Angeles—\$1400.

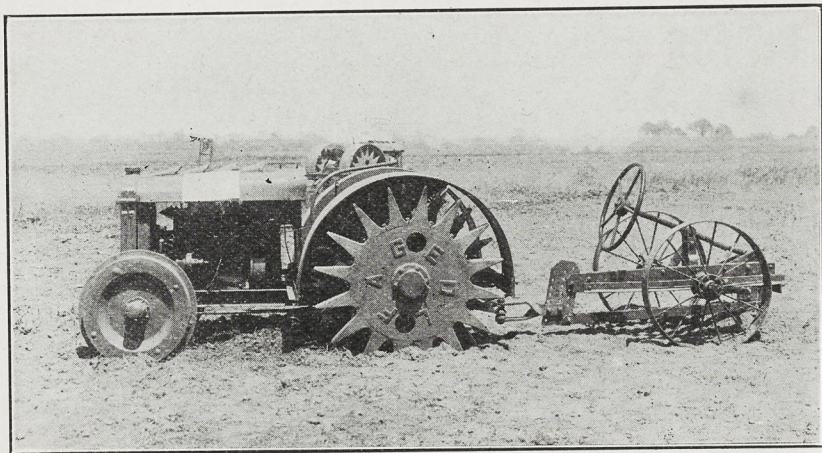


Bean Giant Triplex Sprayer

SPECIFICATIONS.

1. Novo engine, 4-horsepower, hopper cooled, with pulley and complete jump spark battery equipment. (Magneto can be furnished extra.)
2. Giant 3-cylinder power pump, with gauge, pressure regulator, and 10 to 1 double back gears.
3. 200-gallon tank with removable strainer and cut-off, and iron well connecting with underneath suction, tool box, footboard and driver's seat.
4. Complete rotary agitator fitted in tank and connected to pump.
5. Special steel platform, with all above parts connected up and securely fastened in position.
6. Hinged wood cover, with canvas sides and end, covering engine and pump; also fitted with hooks for carrying hose and rods.
7. Special low down truck, 28 x 32-inch wheels, 4-inch grooved tires 4 feet between centers, 4000 pounds capacity.
8. 100 feet Bean spray hose fitted in two lengths of 50 feet each, unless otherwise specified.
9. Two 8, 10 or 12 feet aluminum bamboo extensions with two nozzles and two cut-offs. (State which length of rod and which kind of nozzles are desired.)
- N. B.—Option 50 feet Bean $\frac{3}{8}$ -inch high pressure spray hose; also one Bean spray gun and one aluminum extension may be substituted for items 8 and 9.
10. Extra plunger packings, valve seats, engine springs, wrenches, spark plugs, can of oil, can of grease, etc.

This outfit will be shipped thoroughly tested and ready for use.



Butler-Veitch

General Offices: Twenty-fourth and Harrison Streets.
Oakland, California

FAGEOL PRODUCTS

Fageol Tractors.

Fageol Trucks—2½, 3½, 4, 5, 6 Ton.

Distributors.

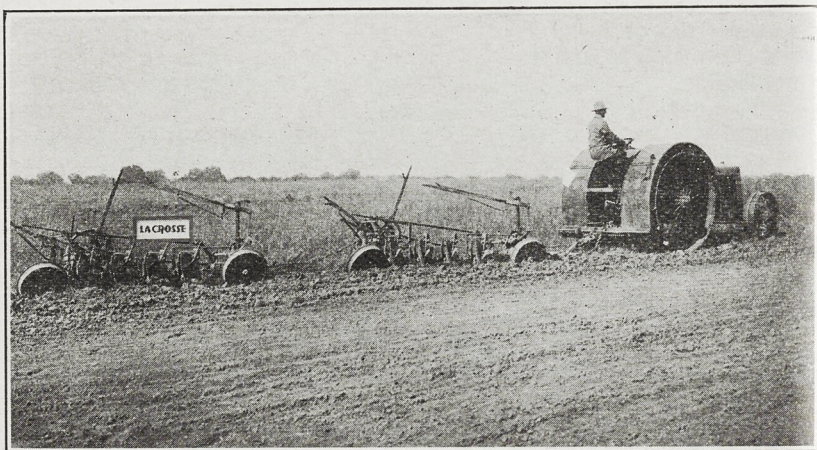
Ahrens and Ahrens	901 First Avenue, Spokane, Wash.
Atterbury Truck Sales Company	343 Oak Street, Portland, Oregon
J. C. Burnam	5610 44th Southwest, Seattle, Washington
Mitchell Motor and Service Company	705 East Pine Street, Seattle, Washington
Motor Sales Corporation	Vancouver, Washington
Nevada Sales Company	Reno, Nevada
Ruddle and Mennillo	226 North Los Angeles Street, Los Angeles, California

Dealers:

L. Artana & Son	San Jose, California
Butler-Veitch	1230 Market Street, San Francisco, California
Ralph H. Butler	920 M Street, Fresno, California
W. A. Bush	Watsonville, California
H. H. Peele Motor Sales Company	401 Yosemite Building, Stockton, California
Spears-Wells Machinery Company	12th and Alice Streets, Oakland, California
Seabright-Hesse Motor Company	Visalia, California
C. J. Tiscornia	San Andreas, California
Vacaville Garage Company	Vacaville, California
E. L. Williams	Hopland, California
Webber Bros.	726 14th Street, Modesto, California
Wixon and Barr	1217 7th Street, Sacramento, California
Guy M. Walden	Middletown, California
City Garage	Porterville, California
Colusa Implement Company	Colusa, California
Electric Garage	Woodland, California
Fageol Sales Company	Santa Rosa, California
S. E. Field, Jr.	Corning, California
Wm. Gare and Son	Chico, California
Charles Green, 7th and D Streets	Eureka, California
Charles Goetz	Sonoma, California
Fred Hauss	Box 710, Marysville, California
A. Lampson and Sons	Geyserville, California
Napa Valley Machine Company	Napa, California
B. R. Ogle	Ornbaum, California
A. H. Patterson	400 North El Dorado Street, Stockton, California

SPECIFICATIONS.

Trade name—FAGEOL.	Lubrication—SPLASH CIRCULATING.
Where made—OAKLAND, CALIF.	Type of oil pump—PLUNGER.
Type—WHEEL.	Make of lubricator—INTEGRAL WITH
H. P. draw bar—9.	MOTOR.
H. P. belt—16.	Oil circulating indicator in driver's vision—
Normal pull in pounds—	YES.
Low gear—1450.	Type of radiator—TUBULAR.
Intermediate.	Water circulation—PUMP.
High gear.	Fan drive—BELT.
Length, inches—114.	Ignition—MAGNETO AND IMPULSE
Width, inches—55.	STARTER.
Height—52".	Make of ignition system—SPLITDORF.
Outside turning radius, feet—10.	Type of governor.
Weight with full equipment—3500.	Self-starter.
Shipping weight—3400.	Diameter of belt pulley—8".
Number wheels—4.	Width of face of belt pulley—6".
Diameter, drive wheels—48".	R.P.M. of belt pulley—1262.
Diameter, other wheels—26".	Belt speed in feet per minute—2643.
Width of face of drive wheels—8".	Pulley drive—CHAIN.
Other wheels—3½".	Location of belt pulley—LEFT SIDE.
Number of tracks.	Transmission clutch—DRY PLATE.
Width of tracks.	Final drive clutches—INTERNAL
Length of track on ground.	EXPANDING.
Motor—LYCOMING MODEL "K".	Transmission system—SPUR GEAR.
Type—VERTICAL.	Miles per hour: Low—2½.
Type of head—"L".	Intermediate.
Number of cylinders—4.	High.
Bore—3½". Stroke—5".	Final drive—GEAR.
Normal revolutions per minute—1200.	Final drive—ENCLOSED.
Number of crank shaft bearings—2.	Gear metal—STEEL, CARBONIZED AND
Front—3 3/16".	HARDENED.
Middle.	BEARINGS—Ball, Roller, Plain or Oilless.
Rear—3 9/16".	Transmission—BALL.
Diameter of crank shaft.	Differential.
Total length of crank shaft bearings—6¾".	Rear axle—ROLLER.
Length of connecting-rod bearing.	Front axle—PLAIN.
Number of piston rings for piston—3.	Fan—ROLLER.
Fuel recommended—GAS, DISTILLATE.	Pulley—ROLLER.
Make of carburetor—TILLOTSON.	Road clearance—12½".
Size of carburetor—1".	Price F.O.B. factory—\$1525.
Capacity of priming tank.	Price F.O.B. Los Angeles—\$1585.
Capacity of fuel tank—10 GALS.	San Francisco—\$1575.
Make and type of air cleaner—FAGEOL	Sacramento—\$1575.
(SPECIAL).	Fresno—\$1575.



California Tractor and Implement Company Distributors

715 L Street, Sacramento, California

La Crosse "Happy Farmer" Tractor, 12-24 H. P.

Little Giant Tractor, Model "B," 16-22 H. P.

Little Giant Tractor, Model "A," 26-35 H. P.

La Crosse "Power Lift" Plows

La Crosse "Power Lift" Disc Plows

La Crosse "Power Lift" Drills

La Crosse Disc Harrows

Dealers:

L. S. Gear.....	1030 First Street, Chico, California
Rodgers-Palmer Company.....	428 Birch Street, Redwood City, California
Parkinson Tractor and Implement Company.....	Fresno, California
W. C. Peters.....	24 North Aurora Street, Stockton, California

SPECIFICATIONS.

Trade name—LITTLE GIANT MODEL B.	Capacity of priming tank—5 gallons.
Where made—MANKATO. MINN.	Capacity of fuel tank—25 gallons.
Type—WHEEL.	Make and type of air cleaner—DONALDSON.
H. P. draw bar—16.	Lubrication—FORCE FEED and SPLASH
H. P. belt—22.	CIRCULATING
Normal pull in pounds—	Type of oil pump—GEAR.
Low gear—4400.	Make of lubricator—OWN MAKE.
Intermediate—2200.	Oil circulating indicator in driver's vision—
High gear—1500.	YES
Length, inches—144.	Type of radiator—HONEYCOMB.
Width, inches—56.	Water circulation—PUMP.
Height—59".	Fan drive—BELT.
Wheel base—87".	Ignition—MAGNETO and IMPULSE
Outside turning radius, feet—15.	STARTER
Weight with full equipment.	Make of ignition system—K. W.
Shipping weight—5200.	Type of governor—OWN MAKE.
Number wheels—4.	Self-starter—NO.
Diameter, drive wheels—54".	Diameter of belt pulley—9".
Diameter, other wheels—30".	Width of face of belt pulley—7".
Width of face of drive wheels—14".	R. P. M. of belt pulley—900.
Other wheels—5".	Belt speed in feet per minute.
Number of tracks.	Pulley drive—GEAR.
Width of tracks.	Location of belt pulley—FRONT.
Length of track on ground.	Transmission clutch—CONE.
Motor—OWN MAKE.	Final drive clutches.
Type—VERTICAL.	Transmission system—SLIDING GEAR.
Type of head—"L."	Miles per hour—Low—13.
Number of cylinders—4.	Intermediate—3.
Bore—4½". Stroke—5".	High—6.
Normal revolutions per minute—900.	Final drive—WORM.
Number of crank shaft bearings—3.	Final drive—OPEN.
Front—5½".	Gear metal—STEEL.
Middle—33".	BEARINGS—Ball, Roller, Plain or Oilless
Rear—6".	Transmission—HYATT ROLLER.
Diameter of crank shaft—2".	Differential—2 ROLLER, 1 BALL.
Total length of crank shaft bearings—15½".	Rear axle—4 HYATT ROLLER.
Length of connecting-rod bearing—2½".	Front axle—4 HYATT ROLLER.
Number of piston rings for piston—4.	Fan—2 BALL.
Fuel recommended—KEROSENE.	Pulley—2 ROLLER.
Make of carburetor—KINGSTON.	Road clearance.
Size of carburetor—1½".	Price F.O.B. factory—\$3300.

SPECIFICATIONS.

Trade name—LITTLE GIANT "MODEL A."

Where made—MANKATO, MINN.

Type—WHEEL.

H. P. draw bar—26.

H. P. belt—35.

Normal pull in pounds—

Low gear—7000.

Intermediate—3500.

High gear—2500.

Length, inches—168.

Width, inches—75.

Height—73".

Outside turning radius, feet—18.

Weight with full equipment.

Shipping weight—8700.

Number of wheels—4.

Diameter, drive wheels—66".

Diameter, other wheels—36".

Width of face of drive wheels—20".

Other wheels—9".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—OWN MAKE.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—4.

Bore—5½". Stroke—6".

Normal revolutions per minute—750.

Number of crank shaft bearings—3.

Front—6".

Middle—4".

Rear—6".

Diameter of crank shaft—2½".

Total length of crank shaft bearings—16".

Length of connecting-rod bearing—3".

Number of piston rings for piston—4.

Fuel recommended—KEROSENE.

Make of carburetor—KINGSTON.

Size of carburetor—1½".

Capacity of priming tank—5 gallons.

Capacity of fuel tank—35 gallons.

Make and type of air cleaner—DONALDSON.

Lubrication—FORCE FEED and SPLASH.

Type of oil pump—GEAR.

Make of lubricator—OWN MAKE.

Oil circulating indicator in driver's vision—

YES

Type of radiator—HONEYCOMB.

Water circulation—PUMP, CENTRIFUGAL.

Fan drive—BALL BEARING, BELT.

Ignition—MAGNETO and IMPULSE

STARTER

Make of ignition system—K. W.

Type of governor—OWN MAKE.

Diameter of belt pulley—13".

Width of face of belt pulley—9".

R. P. M. of belt pulley—750.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—FRONT.

Transmission clutch—CONE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1½.

Intermediate—3.

High—6.

Final drive—WORM.

Final drive—OPEN.

Gear metal—STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—HYATT ROLLER.

Differential—2 ROLLER, 1 BALL.

Rear axl—4 HYATT ROLLER.

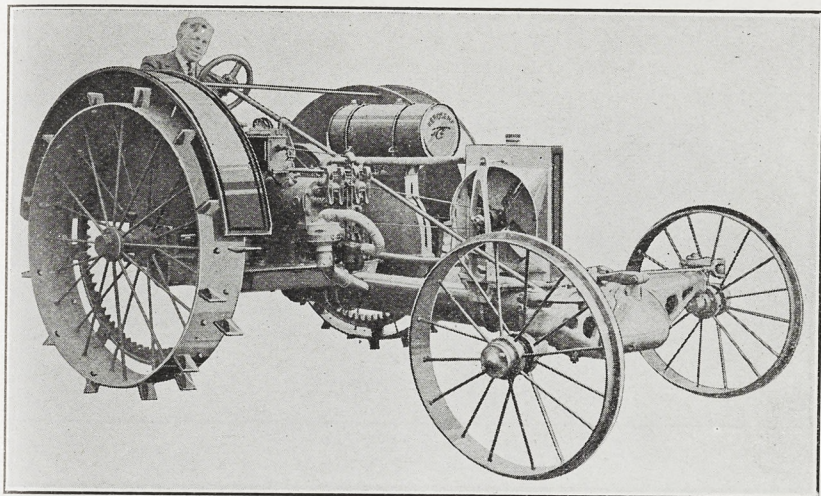
Front axle—4 HYATT ROLLER.

Fan—2 BALL.

Pulley—2 ROLLER.

Road clearance.

Price F.O.B. factory—\$1950.



SPECIFICATIONS.

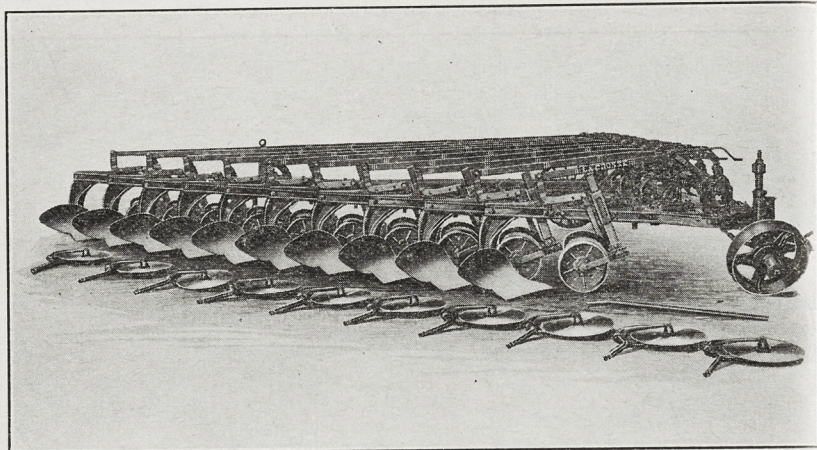
Trade name—LA CROSSE.
Where made—LA CROSSE, WIS.
Type—WHEEL.
H. P. draw bar—12.
H. P. belt—24.
Normal pull in pounds—
Low gear.
Intermediate—2000.
High gear.

Length, inches—135.
Width, inches—82½.
Height—62".
Outside turning radius—91".
Weight with full equipment—4340.
Shipping weight.
Number of wheels—4.
Diameter, drive wheels—56".
Diameter, other wheels—36".
Width of face of drive wheels—10".
Other wheels—4".
Number of tracks.
Width of tracks.
Length of track on ground.
Motor—OWN MAKE.
Type—HORIZONTAL.
Type of head—VALVE IN HEAD.
Number of cylinders—2.
Bore—6". Stroke—7".
Normal revolutions per minute—750.
Number of crank shaft bearings—2.
Front—5".
Middle.
Rear—5½".

Diameter of crank shaft—2¼".
Total length of crank shaft bearings—10½".
Length of connecting-rod bearing—3½".
Number of piston rings for piston—4.
Fuel recommended—KEROSENE.
Make of carburetor—KINGSTON.
Size of carburetor—1½".

Capacity of priming tank—2 GALS.
Capacity of fuel tank—13 GALS.
Make and type of air cleaner—BENNETT.
Lubrication—FORCE FEED AND SPLASH
CIRCULATING.
Type of oil pump—PLUNGER.
Make of lubricator—MADISON-KIPP.
Oil circulating indicator in driver's vision—
YES.

Type of radiator—HONEYCOMB.
Water circulation—PUMP.
Fan drive—BELT.
Ignition—BATTERY.
Make of ignition system—ATWATER-KENT.
Type of governor—FLY-BALL.
Self-starter.
Diameter of belt pulley—11".
Width of face of belt pulley—7½".
R.P.M. of belt pulley—750.
Belt speed in feet per minute.
Pulley drive—DIRECT.
Location of belt pulley—REAR.
Transmission clutch—CONTRACTING BAND.
Final drive clutches—CONTRACTING BAND.
Transmission system—SLIDING GEAR.
Miles per hour: Low.
Intermediate—2½.
High.
Final drive—SPUR GEAR.
Final drive—OPEN.
Gear metal—CAST STEEL.
BEARINGS—Ball, Roller, Plain or Oilless.
Transmission—HYATT ROLLER.
Differential—HYATT ROLLER.
Rear axle—HYATT ROLLER.
Front axle—HYATT ROLLER.
Fan—NEW DEPARTURE BALLBEARING.
Pulley—HYATT ROLLER.
Road clearance—23".
Price F.O.B. factory—\$1250.



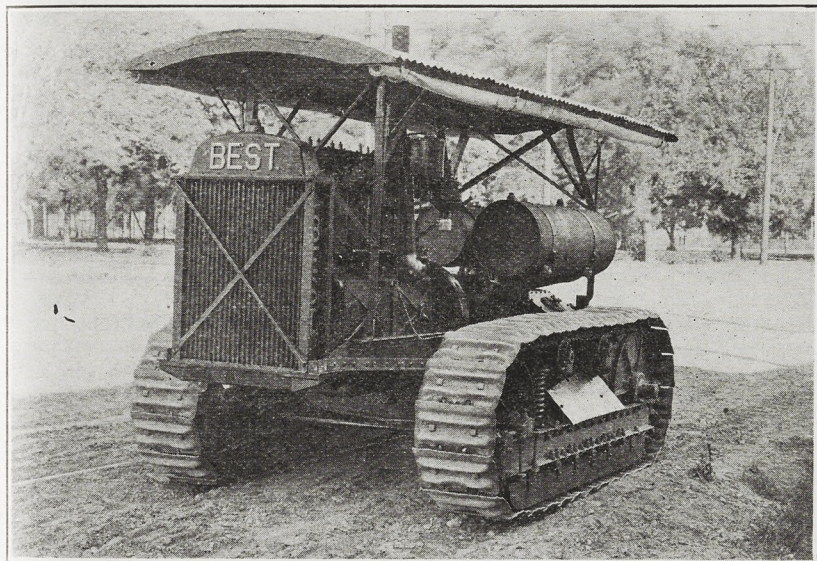
La Crosse Moldboard Plows.

Trade name and number.....	No. 2	No. 3	No. 4	No. 5	No. 22	N. 23	No. 33	
							hard-pan	Independent beam
Number of bottoms.....	2-3	2-3	3-4	3-4-5	2-3	2-3	2-3-4	4-6-8-10
Width of bottoms.....	10"-14"	10"-14"	10"-14"	10"-14"	12"-14"	12"-14"	10"	14"
Depth adjustment.....	Lever	Lever	Lever	Lever	Lever	Lever	Lever	Lever
Type of beam.....	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Independent 4-6-8-10
Style of hitch.....	Flex. bar	Flex. bar	Flex. bar	Flex. bar	Flex. bar	Flex. bar	Flex. bar	Chain
Type of share.....	Q.D.	Q.D.	Q.D.	Q.D.	Q.D.	Q.D.	Slip pt.	Q.D.
Weight, pounds.....	1027	1224	1228	1420	870	1067	1220	5000-9000

Disc Plows

Trade name and number.....	Light tractor	Montana
Number of discs.....	3, 4, or 5	4, 5, 6, 7
Diameter of discs.....	24" 26"	24" 26"
Width of cut per disc.....	9"	8" 11"
Kind of lift.....	Power	Power or hand
Style of hitch.....	Flexible bar	Flexible bar
Type of disc bearing.....	Chilled	Chilled
Weight.....	1880 lbs.	3600 lbs.

Price f. o. b. Sacramento.



C. L. Best Gas Traction Company

San Leandro, California

BEST TRACKLAYER TRACTOR

SPECIFICATIONS.

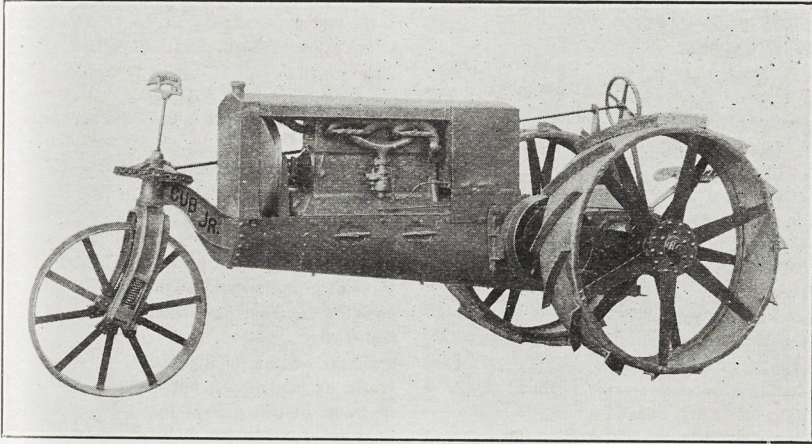
Trade name—TRACK LAYER.	Capacity of priming tank—5 GALS.
Where made—SAN LEANDRO, CALIF.	Capacity of fuel tank—15 GALS.
Type—TRACK.	Make and type of air cleaner.
H. P. draw bar—12.	Lubrication—SPLASH CIRCULATING.
H. P. belt—25.	Type of oil pump—GEAR.
Normal pull in pounds—	Make of lubricator.
Low gear—2500.	Oil circulating indicator in driver's vision—
Intermediate.	NO.
High gear—1800.	Type of radiator—TUBULAR.
Length, inches—125.	Water circulation—PUMP.
Width, inches—51.	Fan drive—GEAR.
Height—56".	Ignition—MAGNETO AND IMPULSE
Outside turning radius, feet.	STARTER.
Weight with full equipment.	Make of ignition system—SPLITDORF-
Shipping weight—5200.	DIXIE.
Number of wheels.	Type of governor—CENTRIFUGAL.
Diameter, drive wheels.	Diameter of belt pulley—9".
Diameter, other wheels.	Width of face of belt pulley—7".
Width of face of drive wheels.	R.P.M. of belt pulley—800.
Other wheels.	Belt speed in feet per minute—2700.
Number of tracks—2.	Pulley drive—GEAR.
Width of tracks—8½".	Location of belt pulley—REAR.
Length of track on ground—60".	Transmission clutch—MULTIPLE DISC.
Motor—BEST.	Final drive clutches—MULTIPLE DISC.
Type—VERTICAL.	Transmission system—SLIDING GEAR.
Type of head—VALVE IN HEAD.	Miles per hour: Low—1½.
Number of cylinders—4.	Intermediate.
Bore—4½". Stroke—5¼".	High—2½.
Normal revolutions per minute—800.	Final drive—GEAR.
Number of crank shaft bearings—3.	Final drive—ENCLOSED.
Front—5½".	Gear metal—45 CARBON.
Middle—3½".	BEARINGS—Ball, Roller, Plain or Oilless.
Rear—7½".	Transmission—ROLLER.
Diameter of crank shaft—2½".	Differential—ROLLER.
Length of crank shaft bearings—16½".	Rear axle—ROLLER.
Length of connecting-rod bearing—2¾".	Front axle.
Number of piston rings for piston—3.	Fan—ROLLER.
Fuel recommended—DISTILLATE.	Pulley—ROLLER.
Make of carburetor—ENSIGN.	Road clearance.
Size of carburetor—1½".	Price F.O.B. factory—\$2450.

SPECIFICATIONS.

Trade name—TRACK LAYER.	Make and type of air cleaner—BENNETT.
Where made—SAN LEANDRO, CALIF.	Lubrication—SPLASH CIRCULATING.
Type—TRACK.	Type of oil pump—GEAR.
H. P. draw bar—35.	Make of lubricator.
H. P. belt—60.	Oil circulating indicator in driver's vision—
Normal pull in pounds—	NO.
Low gear—8000.	Type of radiator—TUBULAR.
Intermediate.	Water circulation—PUMP.
High gear—6000.	Fan drive—GEAR.
Length, inches—140 $\frac{3}{4}$.	Ignition—MAGNETO AND IMPULSE
Width, inches—90.	STARTER.
Height—100 $\frac{3}{4}$ ".	Make of ignition system—AMERICAN
Outside turning radius, feet.	BOSCH.
Weight with full equipment—17,900.	Type of governor—FLY-BALL.
Shipping weight—17,500.	Self-starter.
Number of wheels.	Diameter of belt pulley—16".
Diameter, drive wheels.	Width of face of belt pulley—10".
Diameter, other wheels.	R.P.M. of belt pulley—650.
Width of face of drive wheels.	Belt speed in feet per minute—2725.
Other wheels.	Pulley drive—GEAR.
Number of tracks—2.	Location of belt pulley—REAR END.
Width of tracks—18" or 24".	Transmission clutch—MULTIPLE DISC.
Length of track on ground—88".	Final drive clutches—MULTIPLE DISC.
Motor—BEST.	Transmission system—SLIDING GEAR.
Type—VERTICAL.	Miles per hour: Low—2.
Type of head—VALVE IN HEAD.	Intermediate.
Number of cylinders—4.	High—3.
Bore—6 $\frac{1}{2}$ ". Stroke—8 $\frac{1}{2}$ ".	Final drive—GEAR.
Normal revolutions per minute—650.	Final drive—ENCLOSED.
Number of crank shaft bearings—3.	Gear metal—45 CARBON.
Front—6 3/16".	BEARINGS—Ball, Roller, Plain or Oilless.
Middle—4 $\frac{3}{8}$ ".	Transmission—ROLLER.
Rear—7 9/16".	Differential—ROLLER.
Diameter of crank shaft—3".	Rear axle—ROLLER.
Total length of crank shaft bearings—	Front axle.
18 10/16".	Fan—BALL.
Length of connecting-rod bearing—3 $\frac{1}{2}$ ".	Pulley—BALL AND ROLLER.
Number of piston rings for piston—4.	Road clearance—14 $\frac{1}{2}$ ".
Fuel recommended—DISTILLATE.	Price F.O.B. factory—\$5500.
Make of carburetor—ENSIGN.	Price F.O.B. Los Angeles—PLUS FREIGHT.
Size of carburetor—2".	San Francisco—PLUS FREIGHT.
Capacity of priming tank—2 $\frac{3}{4}$ GALS.	Sacramento—PLUS FREIGHT.
Capacity of fuel tank—52 GALS.	Fresno—PLUS FREIGHT.

SPECIFICATIONS.

Trade name—TRACK LAYER.	Size of carburetor—2".
Where made—SAN LEANDRO, CAL.	Capacity of priming tank—6 gallons.
Type—TRACKS.	Capacity of fuel tank—70 gallons.
H. P. draw bar—40.	Make and type of air cleaner—BENNETT.
H. P. belt—75.	Lubrication—FORCE FEED and SPLASH CIRCULATING
Normal pull in pounds—	Type of oil pump—GEAR.
Low gear—15,000.	Make of lubricator—McCORD.
Intermediate.	Type of radiator—TUBULAR.
High gear—8000.	Water circulation—PUMP.
Length, inches—268.	Fan drive—BELT.
Width, inches—103.	Ignition—MAGNETO and IMPULSE STARTER
Height—120".	Make of ignition system—K. W.
Outside turning radius, feet—50.	Type of governor—BALL.
Weight with full equipment—28,000.	Diameter of belt pulley—16".
Shipping weight—28,000.	Width of face of belt pulley—10".
Number of wheels—1 front wheel.	R. P. M. of belt pulley—643.
Diameter, drive wheels.	Belt speed in feet per minute.
Diameter, other wheels.	Pulley drive—GEAR.
Width of face of drive wheels.	Location of belt pulley—SIDE.
Other wheels—24".	Transmission clutch—EXPANDING SHOE.
Number of tracks—2.	Final drive clutches—NO.
Width of tracks—24" or 30".	Transmission system.
Length of track on ground—61".	Miles per hour: Low—1½.
Motor—BEST.	Intermediate.
Type—VERTICAL.	High—24.
Type of head—VALVE IN HEAD.	Final drive—GEAR.
Number of cylinders—4.	Final drive—ENCLOSED.
Bore—7¾". Stroke—9".	Gear metal—35 CARBON.
Normal revolutions per minute—435.	BEARINGS—Ball, Roller, Plain or Oilless
Number of crank shaft bearings—5.	Transmission—PLAIN BABBITT.
Front—6¾".	Differential—PLAIN BABBITT.
Middle—5".	Rear axle—PLAIN BRONZE.
Rear—8½".	Front axle—PLAIN.
Diameter of crank shaft—3¼".	Fan—PLAIN BABBITT.
Length of crank shaft bearings—30".	Pulley—PLAIN BABBITT.
Length of connecting-rod bearing—5".	Road clearance—15".
Number of piston rings for piston—3.	Price F.O.B. factory—\$5850.
Fuel recommended—DISTILLATE.	
Make of carburetor—ENSIGN.	



Douglas Boswell Company

Sacramento

BRANCHES:

LOS ANGELES

SACRAMENTO

PORTLAND

MARYSVILLE

STOCKTON

MODESTO

EXETER

Pacific Coast Distributers:

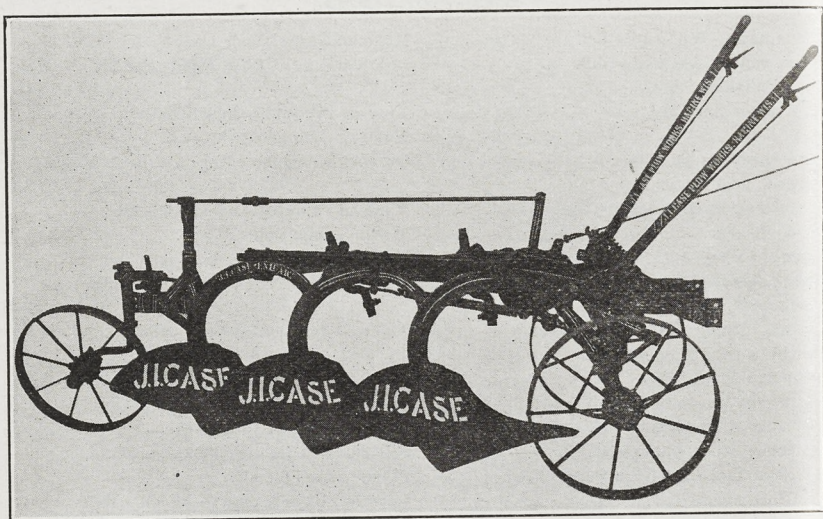
Wallis Tractors and J. I. Case Power Farming Implements

SPECIFICATIONS.

Trade name—WALLIS CUB JUNIOR.	Capacity of fuel tank—20 gallons.
Where made—RACINE, WIS.	Make and type of air cleaner—BENNETT.
Type—WHEEL.	Lubrication—FORCE and SPLASH.
H. P. draw bar—15.	Type of oil pump—PLUNGER.
H. P. belt—25.	Make of lubricator—WALLIS.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—2000.	YES
Intermediate.	
High gear.	Type of radiator—HONEYCOMB.
Length, inches—139.	Water circulation—PUMP.
Width, inches—60.	Fan drive—BELT.
Height—64".	Ignition—MAGNETO and IMPULSE
Wheel base.	STARTER
Outside turning radius, feet—10.	Make of ignition system—BOSCH.
Weight with full equipment—3000.	Type of governor—HYDRAULIC.
Shipping weight—3345.	Self-starter.
Number of wheels—2 rear; 1 front.	Diameter of belt pulley—18".
Diameter, drive wheels—48".	Width of face of belt pulley—6½".
Diameter, other wheels—30".	R. P. M. of belt pulley—430.
Width of face of drive wheels—12".	Belt speed in feet per minute.
Other wheels—8".	Pulley drive—GEAR.
Number of tracks.	Location of belt pulley—LEFT SIDE.
Width of tracks.	Transmission clutch—EXPANDING SHOE.
Length of track on ground.	Final drive clutches.
Motor—WALLIS MODEL J.	Transmission system—SLIDING GEAR.
Type—VERTICAL.	Miles per hour: Low—2½.
Type of head—VALVE IN HEAD.	Intermediate.
Number of cylinders—4.	High—4.
Bore—4¼". Stroke—5¾".	Final drive—GEAR.
Normal revolutions per minute—850.	Final drive—ENCLOSED.
Number of crank shaft bearings—3.	Gear metal—STEEL.
Front—2¾".	BEARINGS—Ball, Roller, Plain or Oilless
Middle—3¼".	Transmission—3 HEAVY DUTY HYATT.
Rear—4¾".	Differential—2 HEAVY DUTY HYATT.
Diameter of crank shaft—2¼".	Rear axle—4 HEAVY DUTY HYATT.
Total length of crank shaft bearing—10¾".	Front axle—2 HEAVY DUTY HYATT.
Length of connecting-rod bearing—2¾".	Fan—1 HEAVY DUTY HYATT.
Number of piston rings for piston—3.	Pulley—HEAVY DUTY HYATT.
Fuel recommended—GAS., DIST., KER.	Road clearance—13".
Make of carburetor—BENNETT.	Price F.O.B. Los Angeles—\$1890.
Size of carburetor—1¼".	San Francisco—\$1890.
Capacity of priming tank—½ gallon.	Sacramento—\$1890.
	Fresno—\$1890.

SPECIFICATIONS.

Trade name—WALLIS CUB.	Make and type of air cleaner—BENNETT.
Where made—RACINE, WIS.	Lubrication—FORCE FEED and SPLASH
Type—WHEEL.	CIRCULATING
H. P. draw bar—30.	Type of oil pump—PLUNGER.
H. P. belt.	Make of lubricator—WALLIS.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—4000.	YES
Intermediate.	Type of radiator—HONEYCOMB.
High gear.	Water circulation—PUMP.
Length, inches—170.	Fan drive—BELT.
Width, inches—74.	Ignition—MAGNETO and IMPULSE
Height—86".	STARTER
Outside turning radius, feet—13.	Make of ignition system—BOSCH.
Weight with full equipment.	Type of governor—HYDRAULIC.
Shipping weight—8500.	Diameter of belt pulley—14".
Number of wheels—2 rear; 1 front.	Width of face of belt pulley—8".
Diameter, drive wheels—60".	R. P. M. of belt pulley—650.
Diameter, other wheels—34".	Belt speed in feet per minute—2275.
Width of face of drive wheels—20".	Pulley drive—GEAR.
Other wheels—14".	Location of belt pulley—REAR LEFT.
Number of tracks.	Transmission clutch—MULTIPLE DISC.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING GEAR.
Motor—WALLIS MODEL C.	Miles per hour: Low—2½.
Type—VERTICAL.	Intermediate.
Type of head—"T."	High—4.
Number of cylinders—4.	Final drive—GEAR.
Bore—6". Stroke—7".	Final drive—OPEN.
Normal revolutions per minute—650.	Gear metal—NICKEL STEEL, HEAT
Number of crank shaft bearings—5.	TREATED
Front.	BEARINGS—Ball, Roller, Plain or Oilless
Middle.	Transmission—6 HEAVY DUTY HYATT.
Rear.	Differential—4 HEAVY DUTY HYATT.
Diameter of crank shaft—2¼".	Rear axle—4 PLAIN.
Total length of crank shaft bearings—25½".	Front axle—2 PLAIN.
Length of connecting-rod bearing—3¼".	Fan—1 HYATT ROLLER.
Number of piston rings for piston—3.	Pulley—2 PLAIN.
Fuel recommended.	Road clearance—14".
Make of carburetor—BENNETT.	Price F. O. B. Los Angeles—\$3600.
Size of carburetor—1½".	San Francisco—\$3600.
Capacity of priming tank—1 gallon.	Sacramento—\$3600.
Capacity of fuel tank—30 gallons.	Fresno—\$3600.



J. I. Case Moldboard Plows.

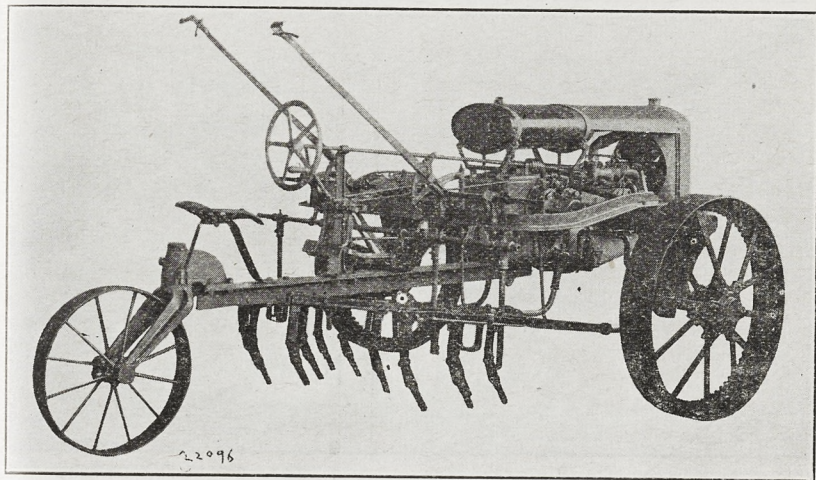
SPECIFICATIONS.

Trade name and number	J. I. Case								
	Enicar	Enicar	Enicar	Enicar	Enicar	Enicar	extra heavy	extra heavy	rice plow
Number of bottoms	2	2	3	3	4	3	2	3	3
Width of bottoms	12"	14"	10"	12"	14"	14"	14"	14"	14"
Kind of lift	Power	Power	Power	Power	Power	Power	Power	Power	Power
Depth adjustment	Lever	Lever	Lever	Lever	Lever	Lever	Lever	Lever	Gauge
Type of beam	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Extra heavy	rigid	Indepdt.
Style of hitch	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid
Type of share	Bolted	Bolted	Bolted	Bolted	Bolted	Bolted	Bolted	Bolted	Bolted
Weight, pounds	668	688	800	873	950	890	723	939	950
Price f.o.b. Sacramento	\$182.28	\$182.64	\$207.50	\$234.59	\$248.50	\$234.83	\$189.69	\$237.17	\$245.50

J. I. Case Disc Plows.

SPECIFICATIONS.

Trade name and number	J. I. Case	J. I. Case	J. I. Case	J. I. Case	J. I. Case	J. I. Case
Number of discs	2	2	3	3	4	4
Diameter of discs	24"	26"	24"	26"	24"	26"
Width of cut per disc	6" 8" 10"	6" 8" 10"	6" 8" 10"	6" 8" 10"	6" 8" 10"	6" 8" 10"
Kind of lift	Power	Power	Power	Power	Power	Power
Style of hitch	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid
Type of disc bearing	Chilled	Chilled	Chilled	Chilled	Chilled	Chilled
Weight, pounds	1255	1269	1389	1414	1595	1618
Price f.o.b. Sacramento	\$223.95	\$228.07	\$250.07	\$255.12	\$291.35	\$297.54



To-Ro Motor Cultivator

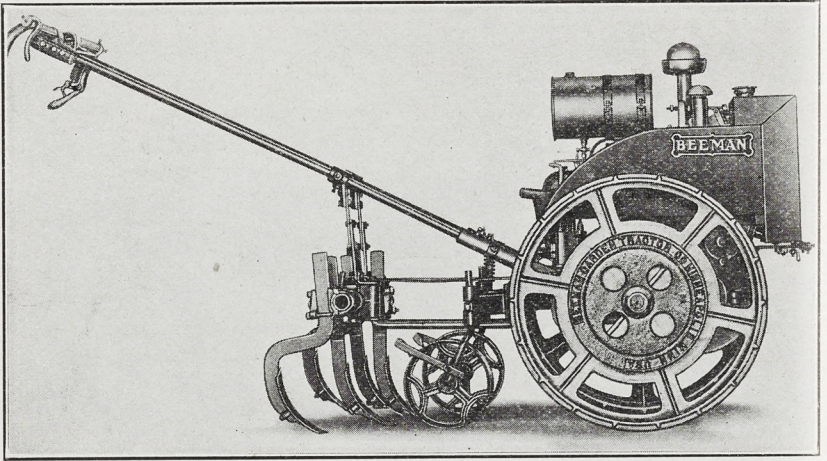
Motor—Four cylinders cast in block $3\frac{1}{8}$ -inch bore by $4\frac{1}{2}$ -inch stroke; automatic governor; high tension magneto; circulating oiling system.

Transmission and Differential—All steel cut gears with 5-7 stub teeth; bevel pinion and bevel gears 4-5 stub teeth; Hyatt roller bearings; end thrust ball bearings; two-speed forward and reverse; $\frac{3}{4}$ to 3 miles per hour.

Clutch—Stouffer twin cone.

Wheels—Two front wheels, 42-inch high, 6-inch face; one rear wheel; machine guided by pivoted front wheels operated from drive seat; 1000 pounds drawbar pull.

Miscellaneous—Width of drive wheels to fit 28-30-40-44-inch rows; special width for different width rows; wheel base 96 inches; clearance under axle for rows, 33 inches.



H. V. Carter Motor Company

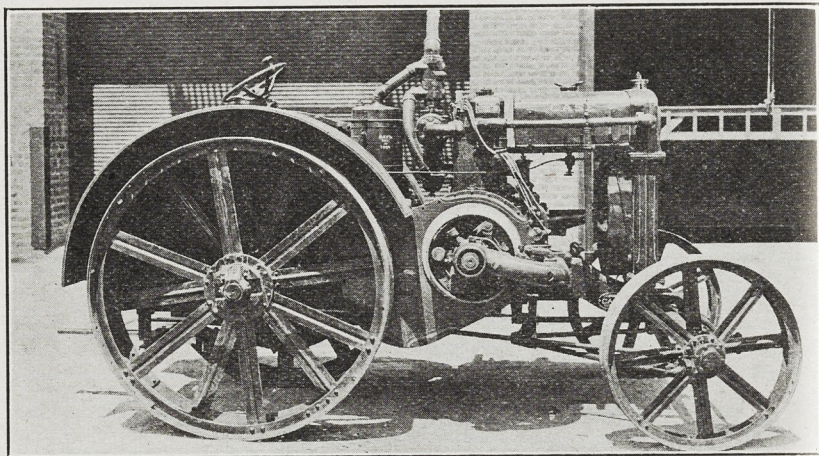
724 Van Ness Avenue, San Francisco

BEEMAN TRACTOR
KNIGHT-LEE TRACTOR
BATES STEEL MULE TRACTOR
HARDIE ORCHARD SPRAYER
McKAY POWER LIFT DISC PLOW AND SUBSOILER
IDEAL POWER LAWN MOWERS
HAYES WIRE WHEELS FOR AUTOMOBILES
GENERAL LINE OF AGRICULTURAL IMPLEMENTS

SPECIFICATIONS.

Trade name—BEEMAN.
 Where made—MINNEAPOLIS, MINN.
 Type—WHEEL.
 H. P. draw bar—2.2.
 H. P. belt—4.2.
 Normal pull in pounds—
 Low gear.
 Intermediate.
 High gear.
 Length—86".
 Width—17½".
 Height—40".
 Outside turning radius, feet.
 Weight with full equipment—550.
 Shipping weight—600.
 Number of wheels—4.
 Diameter, drive wheels—25".
 Diameter, other wheels—16".
 Width of face of drive wheels—3½".
 Other wheels—3".
 Number of tracks.
 Width of tracks.
 Length of track on ground.
 Motor—OWN.
 Type—HORIZONTAL.
 Type of head—"L."
 Number of cylinders—1.
 Bore—3½". Stroke—4½".
 Normal revolutions per minute—750.
 Number of crank shaft bearings—2.
 Front.
 Middle.
 Rear.
 Diameter of crank shaft.
 Length of crank shaft bearings.
 Length of connecting-rod bearing.
 Number of piston rings for piston—3.
 Fuel recommended—GASOLINE.

Make of carburetor—KINGSTON.
 Size of carburetor—¾".
 Capacity of priming tank.
 Capacity of fuel tank—2 gallons.
 Make and type of air cleaner—DONALDSON.
 Lubrication—SPLASH.
 Type of oil pump.
 Make of lubricator.
 Type of radiator—HONEYCOMB.
 Water circulation—THERMO SYPHON.
 Fan drive—BELT.
 Ignition—MAGNETO.
 Make of ignition system—HEINZ.
 Type of governor—THROTTLE.
 Diameter of belt pulley—4½".
 Width of face of belt pulley—3½".
 R. P. M. of belt pulley—750.
 Belt speed in feet per minute.
 Pulley drive—DIRECT.
 Location of belt pulley.
 Transmission clutch.
 Final drive clutches.
 Transmission system.
 Miles per hour: Low—¾.
 Intermediate.
 High—2½.
 Final drive—GEAR.
 Final drive—ENCLOSED.
 Gear metal—STEEL.
 BEARINGS—Ball, Roller, Plain or Oilless
 Transmission.
 Differential.
 Rear axle.
 Front axle.
 Fan—NORMA.
 Pulley.
 Road clearance.
 Price F.O.B. San Francisco—\$315.



J. I. Case Threshing Machine Company, Inc.

Home Office and Factory, Racine, Wisconsin

San Francisco Branch, 235 Fifteenth Street

AUTOMOBILES
GAS AND OIL TRACTORS
STEAM TRACTORS
GRAND DETOUR PLOWS
GRAND DETOUR DISC HARROWS
HAY BALERS
BELTS
ROAD GRADERS
ROAD ROLLERS
ROAD MACHINERY
ROCK CRUSHERS
THRESHERS, GRAIN
THRESHERS, PEA AND BEAN
THRESHERS, RICE
THRESHERS, CLOVER
THRESHERS, ALFALFA
THRESHERS, CORN
SILO FILLERS

SPECIFICATIONS.

Trade name—CASE 15-27.	Capacity of priming tank—2 $\frac{3}{4}$ " gallons.
Where made—RACINE, WIS.	Capacity of fuel tank—20 gallons.
Type—WHEEL.	Make and type of air cleaner—OWN, WATER.
H. P. draw bar—15.	Lubrication—FORCE FEED and SPLASH.
H. P. belt—27.	Type of oil pump—PLUNGER.
Normal pull in pounds—	Make of lubricator.
Low gear—2500.	Oil circulating indicator in driver's vision—
Intermediate.	YES
High gear.	Type of radiator—TUBULAR and FIN.
Length—10' 7".	Water circulation—PUMP.
Width, inches—72.	Fan drive—GEAR.
Height—68".	Ignition—MAGNETO and IMPULSE
Outside turning radius, feet—13 $\frac{1}{2}$.	STARTER
Weight with full equipment—5750.	Make of ignition system—BOSCH.
Shipping weight—5700.	Type of governor—FLY-BALL.
Number of wheels—4.	Diameter of belt pulley—16".
Diameter, drive wheels—52".	Width of face of belt pulley—6 $\frac{3}{4}$ ".
Diameter, other wheels—32".	R. P. M. of belt pulley—900.
Width of face of drive wheels—12".	Belt speed in feet per minute—3762.
Other wheels—6".	Pulley drive—DIRECT.
Number of tracks.	Location of belt pulley—ON CRANK SHAFT.
Width of tracks.	Transmission clutch—EXPANDING SHOE.
Length of track on ground.	Final drive clutches.
Motor—OWN.	Transmission system—SLIDING GEAR.
Type—VERTICAL.	Miles per hour: Low—2 $\frac{1}{4}$.
Type of head—VALVE IN HEAD.	Intermediate.
Number of cylinders—4.	High—3 $\frac{1}{2}$.
Bore—4 $\frac{1}{2}$ ". Stroke—6".	Final drive—GEAR.
Normal revolutions per minute—900.	Final drive—ENCLOSED.
Number of crank shaft bearings—3.	Gear metal—STEEL.
Front—4 $\frac{1}{2}$ ".	BEARINGS—Ball, Roller, Plain or Oilless
Middle—3 $\frac{3}{8}$ ".	Transmission—2 HYATT ROLLER.
Rear—4 $\frac{1}{2}$ ".	Differential.
Diameter of crank shaft—2 $\frac{1}{4}$ ".	Rear axle—2 HYATT ROLLER.
Total length of crank shaft bearings—12 $\frac{3}{4}$ ".	Front axle—PLAIN.
Length of connecting-rod bearing—2 $\frac{3}{4}$ ".	Fan—BALL.
Number of piston rings for piston—3.	Pulley—PLAIN.
Fuel recommended—GAS, DIST, KER.	Road clearance—14".
Make of carburetor—KINGSTON.	Price F.O.B. factory—\$1600.
Size of carburetor—1 $\frac{3}{8}$ ".	

SPECIFICATIONS.

Trade name—CASE 10-18.
Where made—RACINE, WIS.

Type—WHEEL.

H. P. draw bar—10.

H. P. belt—18.

Normal pull in pounds—

Low gear—1660.

Intermediate.

High gear.

Length—101½".

Width—56".

Height—54½".

Outside turning radius, feet—11.

Weight with full equipment—3550.

Shipping weight—3510.

Number of wheels—4.

Diameter, drive wheels—42".

Diameter, other wheels—30".

Width of face of drive wheels—9".

Other wheels—6".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—OWN.

Type—VERTICAL.

Type of head—VALVE IN HEAD.

Number of cylinders—4.

Bore—3½". Stroke—5".

Normal revolutions per minute—1050.

Number of crank shaft bearings—2.

Front—4½".

Middle.

Rear—4½".

Diameter of crank shaft—2½".

Total length of crank shaft bearings—9".

Length of connecting-rod bearing—2½".

Number of piston rings for piston—3.

Fuel recommended—GAS., DIST., KER.

Make of carburetor—KINGSTON.

Size of carburetor—1½".

Capacity of priming tank—2 gallons.

Capacity of fuel tank—10½ gals.

Make and type of air cleaner—OWN, WATER.

Lubrication—FORCE FEED AND SPLASH.

Type of oil pump—PLUNGER.

Make of lubricator.

Oil circulating indicator in driver's vision—

YES

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—GEAR.

Ignition—MAGNETO and IMPULSE

STARTER

Make of ignition system—BOSCH

AMERICAN

Type of governor—CENTRIFUGAL.

Diameter of belt pulley—14½".

Width of face of belt pulley—5¼".

R. P. M. of belt pulley—1050.

Belt speed in feet per minute—3984.

Pulley drive—DIRECT.

Location of belt pulley—ON CRANK SHAFT.

Transmission clutch—EXPANDING SHOE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—2½.

Intermediate.

High—3½.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—STEEL.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—HYATT ROLLER.

Differential.

Rear axle—2 HYATT ROLLER.

Front axle—2 HYATT ROLLER.

Fan—BALL.

Pulley—OWN, PLAIN.

Road clearance—12½".

Price F.O.B. factory—\$1200.

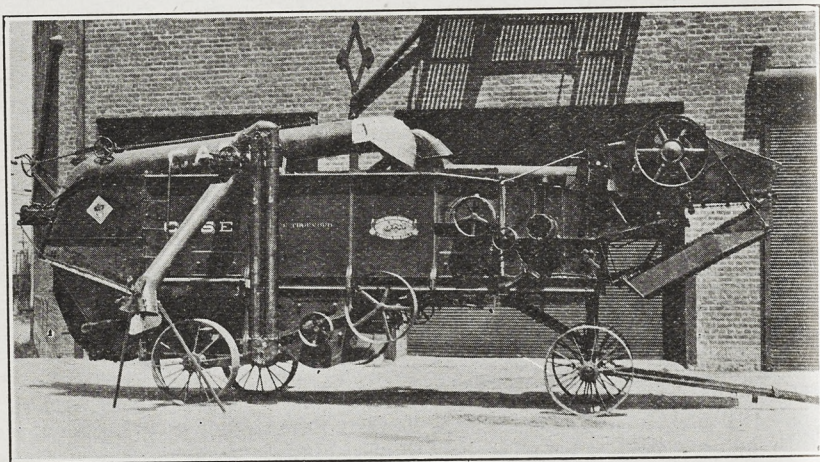
Grand Detour Moldboard Plows

Trade name and number.....	#15	Jr.	Jr.	Jr.
Number of bottoms.....	2	4	3	2
Width of bottoms.....	10"12"14"	10"12"14"	10"12"14"	10"12"14"
Kind of lift.....	Power	Power	Power	Power
Depth adjustment	Gauge	Lever	Lever	Lever
	wheel			
Type of beam.....	Inde-			
	pendent	Rigid	Rigid	Rigid
Style of hitch.....	Chain	Break-	Break-	Univer-
		pin	pin	sal
Type of share.....	Bolted	Bolted	Bolted	Bolted
Weight	1900#	1400#	1000#	700-750#
Price F.O.B. Sacramento.....				

Trade Name and Number	#20	#4	#5	#6	#8
Number of bottoms.....	4	4	5	6	8
Width of bottoms.....	14"	14"	14"	14"	14"
Kind of lift.....	Power	Power	Power	Power	Power
Depth adjustment	Gauge	Gauge	Gauge	Gauge	Gauge
	wheel	wheel	wheel	wheel	wheel
Type of beam.....	Inde-	Inde-	Inde-	Inde-	Inde-
	pendent	pendent	pendent	pendent	pendent
Style of hitch.....	Chain	Chain	Chain	Chain	Chain
Type of share.....	Bolted	Bolted	Bolted	Bolted	Bolted
Weight	2535#	2805#	3530#	4385#	5800#
Price F.O.B. Sacramento.....					

Grand Detour Disc Plows

Trade name and number.....	No. 54A	No. 54	No. 53A	No. 53
Number of discs.....	3	4	2	3
Diameter of discs.....	24"	24"	24"	24"
Width of cut per disc				
Kind of lift.....	Power	Power	Power	Power
Style of hitch.....	Break pin	Break pin	Break pin	Break pin
Type of disc bearing (ball, chilled, etc.)				
Weight	1372 lbs.	1535 lbs.	1170 lbs.	1343 lbs.
Price f.o.b. Sacramento.				

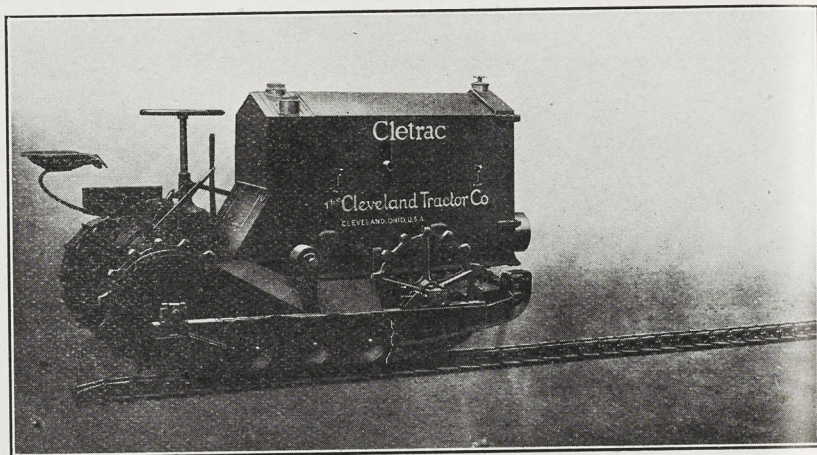


Threshing Machines

J. I. Case T. M. Co.

SPECIFICATIONS.

1. Width of cylinder-----	26"	20"	26"	28"	32"	36"	40"
2. Width of separator-----	28"	28"	36"	46"	54"	58"	62"
3. Cylinder pulley diameter-----							
4. Pulley face-----							
5. Pulley speed in R. P. M.-----	1100	1075	1075	Optional	750	750	750
6. Horsepower with SF and WS required (approximate)-----	12	20	27	Optional	50	60	65
7. Capacity in bushels per hour-----							
Wheat-----	30 to 50	60 to 90	80 to 125	90 to 140	100 to 150	120 to 175	155 to 210
Oats-----	60 to 90	100 to 175	150 to 225	175 to 260	190 to 300	220 to 340	250 to 400
Rice-----				125 to 260	150 to 300	165 to 350	200 to 400
8. Over all dimensions (on road)-----							
Height-----	72½"	98½"	98½"	10' 5"	10' 4"	10' 4"	10' 4"
Width-----	73½"	74"	84"	7' 5½"	7' 9½"	8' 1½"	8' 5½"
Length-----	18'	25' 5"	25' 5"	27' 11½"	27' 11½"	27' 11½"	27' 11½"
9. Weight, fully equipped-----	3100 lbs.	4730 lbs.	5380 lbs.	8780 lbs.	9105 lbs.	9430 lbs.	9805 lbs.



Cletrac; Tank Type
CLEVELAND TRACTOR COMPANY

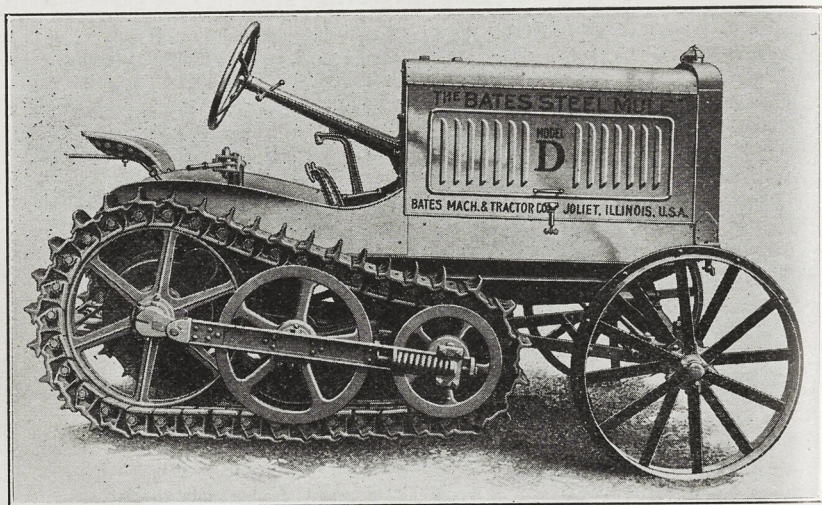
Factory: Cleveland, Ohio

District Office: 147 New Montgomery Street, San Francisco, California
Dealers:

C. E. Weikert Tractor Company	Sacramento
Kelly Hardware Company	Modesto
The Gardiner Company	Isleton
W. R. Wood	Walnut Creek
Rowley M. Thomas	Gilroy
E. B. Terry	Watsonville
Fred C. Steiner	Santa Rosa
Hollister Garage	Hollister
Modoc Auto Company	Alturas
C. W. Hicks & Son	Chico
Martin & Rosebrook	Hamilton City
Ellis & Burke	Esparto
Joseph Boyd	Concord
E. T. Aylward	Lawrence
Westcamp & Stow	Colusa
Halsey W. Smith	Auburn
Feather River Garage	Oroville

SPECIFICATIONS.

Trade name—CLETRAC TANK TYPE.	Capacity of fuel tank 13 gallons.
Where made—CLEVELAND OHIO.	Make and type of air cleaner—WATER.
Type—TRACK.	Lubrication—FORCE FEED.
H. P. draw bar—12.	Type of oil pump—GEAR.
H. P. belt—20.	Make of lubricator.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—1750.	YES
Intermediate.	Type of radiator—TUBULAR.
High gear.	Water circulation—PUMP.
Length, inches—96.	Fan drive—BELT.
Width, inches—52.	Ignition—MAGNETO and IMPULSE
Height—50".	STARTER
Wheel base.	Make of ignition system—EISEMANN or
Outside turning radius, feet—6.	TEAGLE
Weight with full equipment—3350.	Type of governor—OWN MAKE.
Shipping weight—3300.	Self-starter.
Number of wheels.	Diameter of belt pulley—6".
Diameter, drive wheels.	Width of face of belt pulley—8".
Diameter, other wheels.	R. P. M. of belt pulley—1200.
Width of face of drive wheels.	Belt speed in feet per minute—2500.
Other wheels.	Pulley drive—DIRECT.
Number of tracks—2.	Location of belt pulley—CRANK SHAFT.
Width of tracks—6 $\frac{3}{4}$ ".	Transmission clutch—DRY PLATE.
Length of track on ground—50".	Transmission system—SLIDING GEAR.
Motor—WEIDLEY.	Miles per hour: 1 speed—3 $\frac{1}{2}$ miles per hour.
Type—VERTICAL.	Final drive—GEAR.
Type of head—VALVE IN HEAD.	Final drive—ENCLOSED.
Number of cylinders—4.	Gear metal—CHROME-NICKEL STEEL,
Bore 3 $\frac{3}{4}$ ". Stroke—5 $\frac{1}{4}$ ".	HEAT TREATED
Normal revolutions per minute—1200.	BEARINGS—Ball, Roller, Plain or Oilless
Number of crank shaft bearings—3.	Transmission—HYATT ROLLER.
Front—2 $\frac{1}{2}$ ".	Differential—HYATT ROLLER.
Middle—2 $\frac{1}{2}$ ".	Rear axle—TIMKEN ROLLER.
Rear—4".	Front axle—TIMKEN ROLLER.
Diameter of crank shaft—2 $\frac{1}{8}$ ".	Fan—HYATT ROLLER.
Total length of crank shaft bearings—9".	Pulley—HYATT ROLLER.
Length of connecting rod bearing—2 $\frac{1}{4}$ ".	Road clearance—12".
Number of piston rings for piston—3.	Price F.O.B. factory—\$1610.
Fuel recommended—GAS., DIST., KER.	Los Angeles—\$1720.
Make of carburetor—KINGSTON "L."	San Francisco—\$1720.
Size of carburetor—1 $\frac{1}{4}$ ".	Sacramento—\$1720.
Capacity of priming tank—1 gallon.	Fresno—\$1720.



The J. M. Conley Company, Incorporated

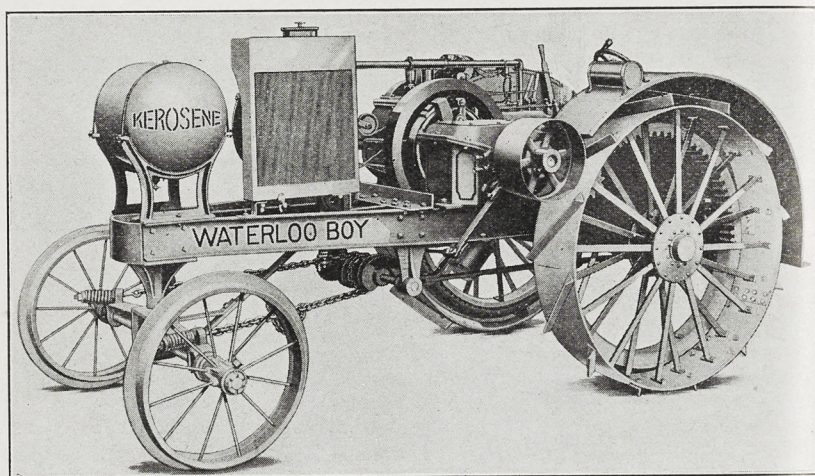
417-423 East Weber Avenue, Stockton

John Deere Plows
Bates Steel Mule Tractor
Waterloo Boy Tractor
J. I. Case Tractor
J. I. Case Thresher
Purviance "One Man" Leveler
Victory Oil Motor
Hardie Power Sprayer
Ventura Bean Machinery

Monarch Pumping Plants
Killifer Tillage Tools
Perfection Milking Machines
Associated Gas Engines
Automatic Water Systems
General Electric Motors
Iowa Cream Separators
Idaho Harvesters

SPECIFICATIONS.

Trade name—BATES STEEL MULE.	Capacity of fuel tank—9 GALS.
Where made—JOLIET, ILL.	Make and type of air cleaner—BENNETT.
Type—TRACK.	Lubrication—FORCE.
H. P. draw bar—15.	Type of oil pump—PLUNGER.
H. P. belt—22.	Make of lubricator.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—2600.	YES.
Intermediate.	Type of radiator—HONEYCOMB.
High gear.	Water circulation—PUMP.
Length, inches—105.	Fan drive—BELT.
Width, inches—56.	Ignition—MAGNETO AND IMPULSE
Height—58".	STARTER.
Outside turning radius, feet—8.	Make of ignition system—DIXIE OR
Weight with full equipment—4500.	EISEMANN.
Shipping weight—4400.	Type of governor—PICKERING.
Number of wheels—2 in front.	Self-starter.
Diameter, drive wheels.	Diameter of belt pulley—12".
Diameter, other wheels.	Width of face of belt pulley—10".
Width of face of drive wheels.	R.P.M. of belt pulley—775.
Other wheels.	Belt speed in feet per minute.
Number of tracks—2.	Pulley drive—GEAR.
Width of tracks—10".	Location of belt pulley—RIGHT SIDE
Length of track on ground.	CENTER.
Motor—ERD.	Transmission clutch—MULTIPLE DISC.
Type—VERTICAL.	Final drive clutches.
Type of head—VALVE IN HEAD.	Transmission system—SLIDING GEAR.
Number of cylinders—4.	Miles per hour: Low—24.
Bore—4". Stroke—6".	Intermediate.
Normal revolutions per minute—900.	High—3.5.
Number of crank shaft bearings—3.	Final drive—GEAR.
Front.	Final drive—ENCLOSED.
Middle.	Gear metal—STEEL, CUT.
Rear.	BEARINGS—Ball, Roller, Plain or Oilless.
Diameter of crank shaft—2".	Transmission—TIMKEN.
Total length of crank shaft bearings—19½".	Differential—TIMKEN.
Length of connecting-rod bearing.	Rear axle—TIMKEN.
Number of piston rings for piston—3.	Front axle—TIMKEN.
Fuel recommended—DISTILLATE.	Fan.
Make of carburetor—BENNETT.	Pulley.
Size of carburetor—1½".	Road clearance—10" LOWEST POINT.
Capacity of priming tank—2 GALS.	Price F.O.B. Sacramento—\$2200.



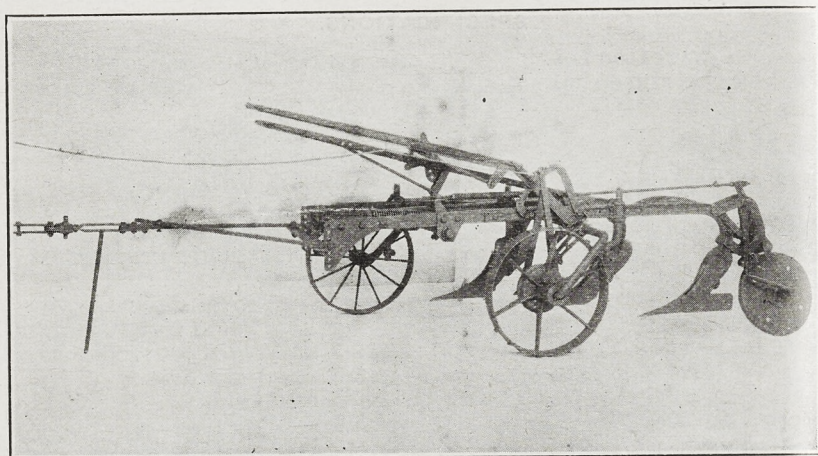
Waterloo Boy

John Deere Plow Company, of San Francisco, Incorporated

VAN BRUNT DRILLS
DISC HARROWS
CULTIVATORS
BINDERS
MOWING MACHINES
HAY RAKES
HAY LOADERS
POTATO DIGGERS AND PLANTERS
BEET PLANTERS
BEAN PLANTERS
BEET AND BEAN CULTIVATORS
ENSILAGE CUTTERS
FEED GRINDERS
CORN SHELLERS
HAY PRESSES
BRUSH-BREAKING PLOWS
WAGONS
SPRING-TOOTH HARROWS

SPECIFICATIONS.

Trade name—WATERLOO BOY.	Make and type of air cleaner—OWN.
Where made—WATERLOO, IOWA.	WATER and SCREENS
Type—WHEEL.	Lubrication—FORCE.
H. P. draw bar—12.	Type of oil pump—PLUNGER.
H. P. belt—25.	Make of lubricator—OWN.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—2400.	YES
Intermediate.	
High gear.	Type of radiator—HONEYCOMB.
Length, inches—136.	Water circulation—PUMP, CENTRIFUGAL.
Width, inches—72.	Fan drive—BELT.
Height—63".	Ignition—MAGNETO and IMPULSE
Outside turning radius, feet—12.	STARTER, SUMPTER
Weight with full oil, fuel and lug equipment—	Make of ignition system—SPLITDORF-DIXIE
6450	Type of governor—FLY-BALL.
Shipping weight—5920.	Diameter of belt pulley—14.
Number of wheels—4. 2 drive; 2 steering.	Width of face of belt pulley—8".
Diameter, drive wheels—52".	R. P. M. of belt pulley—750.
Diameter, other wheels—28".	Belt speed in feet per minute—2750.
Width of face of drive wheels—12".	Pulley drive—DIRECT.
Other wheels—6".	Location of belt pulley—LEFT SIDE.
Number of tracks.	Transmission clutch—CONTRACTING BAND.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING GEAR.
Motor—OWN.	Miles per hour: Low—2½.
Type—HORIZONTAL.	Intermediate.
Type of head—VALVE IN HEAD.	High—3.
Number of cylinders—2.	Final drive—GEAR.
Bore—6½". Stroke—7".	Final drive—OPEN.
Normal revolutions per minute—750.	Gear metal—PINION, CAST STEEL; GEAR,
Number of crank shaft bearings—2.	SEMI-STEEL
Front—5½".	BEARINGS—Ball, Roller, Plain or Oilless
Middle.	Transmission—HYATT.
Rear—5½".	Differential—HYATT.
Diameter of crank shaft—2½".	Rear axle—HYATT.
Total length of crank shaft bearings—11.	Front axle—PLAIN.
Length of connecting-rod bearing—3½".	Fan—OAKES BALL.
Number of piston rings for piston—4.	Pulley—HYATT.
Fuel recommended—KEROSENE.	Road clearance—14".
Make of carburetor—SCHEBLER.	Price F.O.B. Los Angeles—\$1450.
Size of carburetor—MODEL D 1½".	San Francisco—\$1450.
Capacity of priming tank—1 gallon.	Sacramento—\$1450.
Capacity of fuel tank—20 gallons.	Fresno—\$1450.



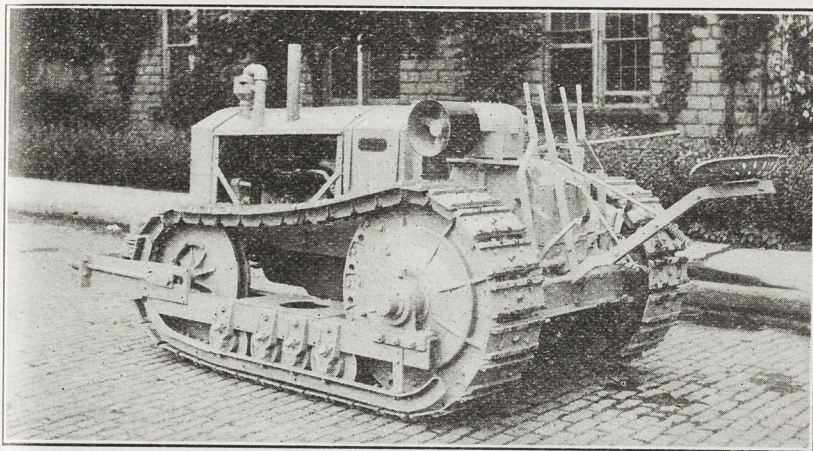
John Deere Moldboard Plows.

Trade name and number.....	No. 6 Pony	Export Little	Export
		Engine Gang.	Engine Gang.
Number of bottoms.....	4	6	6, 8, 10
Width of bottoms.....	10"	14"	14"
Kind of lift.....	Automatic	Lever	Lever
Depth adjustment	Lever	Lever	Lever
Type of beam.....	Rigid 4 beam unit	2 bottom units	2 beam units Chain
Style of hitch.....	Rigid	Chain	
Type of share.....	Q.D.	Q.D.	Q.D.
Weight	1250 lbs.	3700 lbs.	4200-4700
Price f.o.b. Sacramento, \$336.00.			5500 lbs.

Disc Plows.

Trade name and number.....	No. 24 Light	30 Series	
		Light Tractor	Heavy Engine
Number of discs.....	4	3-4-5	4-6
Diameter of discs.....	24"	24" or 26"	24"-26"
Width of cut per disc.....	10"	10"	10"
Kind of lift.....	Automatic	Power	Lever
Style of hitch.....	Stiff	Rigid	Rigid
Type of disc bearing.....	Chilled	Chilled	Chilled
Weight	1790 lbs.	1590-1790-2030 lbs.	2700-3230 lbs.

Price, f.o.b. Sacramento, \$310.00.



Frank Dimond, Distributor
1800 R Street, Sacramento, California
TRUNDAAR TRACTOR

SPECIFICATIONS.

Trade name—TRUNDAAR.
 Where made—ANDERSON, IND.
 Type—TRACK.

H. P. draw bar—20.

H. P. belt—35.

Normal pull in pounds—
 Low gear.

Intermediate.

High gear.

Length, inches—120.

Width, inches—74.

Height—58".

Outside turning radius, feet—12.

Weight with full equipment—9850.

Shipping weight—9500.

Number of wheels.

Diameter, drive wheels—36".

Diameter, other wheels.

Width of face of drive wheels.

Other wheels.

Number of tracks—2.

Width of tracks—15".

Length of track on ground—72".

Motor—WAUKESHA.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—4 $\frac{3}{8}$ ". Stroke—6 $\frac{3}{8}$ ".

Normal revolutions per minute—850.

Number of crank shaft bearings—3.

Front—3 $\frac{3}{4}$ ".

Middle—4 $\frac{1}{2}$ ".

Rear—4 $\frac{1}{2}$ ".

Diameter of crank shaft—2".

Total length of crank shaft bearings—12 $\frac{1}{4}$ ".

Length of connecting-rod bearing—3".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—ENSGN.

Size of carburetor.

Capacity of priming tank—3 GALS.

Capacity of fuel tank—30 GALS.

Make and type of air cleaner—WILCOX.

BENNETT.

Lubrication—SPLASH CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO AND IMPULSE

STARTER.

Make of ignition system—BOSCH

AMERICAN.

Type of governor—WAUKESHA.

Self-starter.

Diameter of belt pulley—10".

Width of face of belt pulley—8 $\frac{1}{2}$ ".

R.P.M. of belt pulley.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—TOP GEAR CASE.

Transmission clutch—MULTIPLE DISC.

Final drive clutches—MULTIPLE DISC.

Transmission system—SLIDING GEAR.

Miles per hour: Low—2.

Intermediate.

High—3.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—BALL.

Differential—BRONZE.

Rear axle—BABBITT.

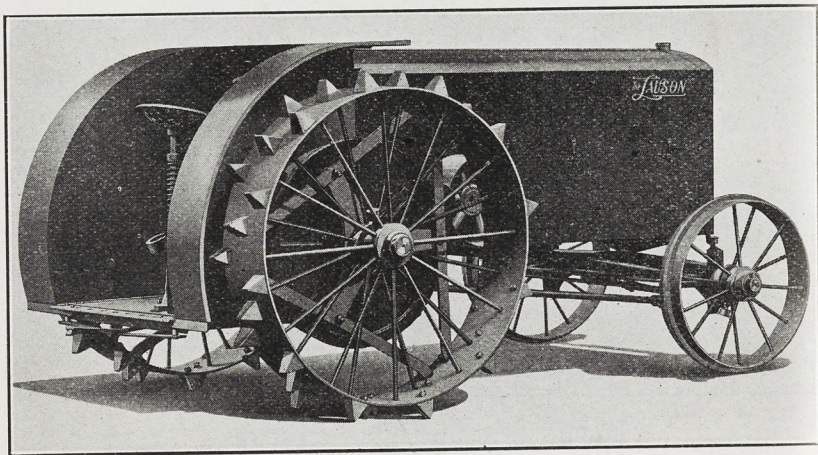
Front axle—BABBITT.

Fan—BALL.

Pulley.

Road clearance—14".

Price F.O.B. Sacramento—\$3625.



De Laval Dairy Supply Company
61 Beale Street, San Francisco, California

DEALERS:

Patterson Supply Company, 6th and J Streets, Sacramento

Lauson Tractors

De Laval Cream Separators

De Laval Milking Machines

Ideal Green Feed Silos

Alpha Gas Engines

Acme Feed Cutters

Sanitary Barn Equipment

Viking Pumps

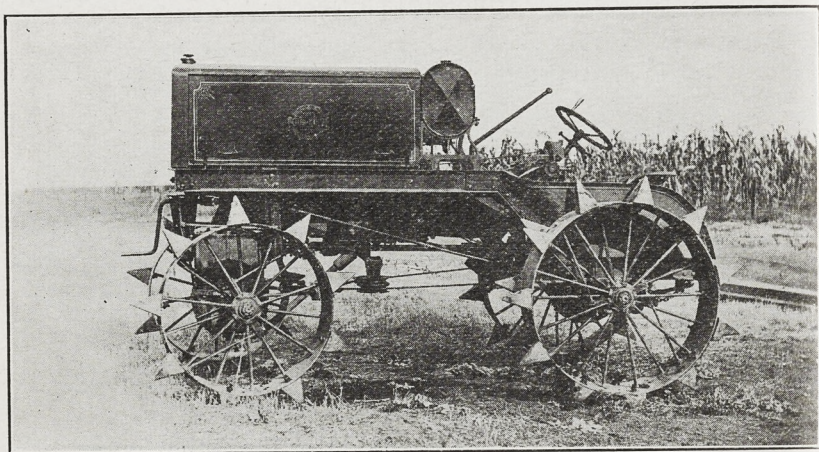
Alpha Power Sprayers

Refrigerator Plants

Dairy Apparatus and Supplies

SPECIFICATIONS.

Trade name—LAUSON "FULL JEWEL."	Lubrication—FORCE FEED AND SPLASH CIRCULATING.
Where made—NEW HOLSTEIN, WIS.	
Type—WHEEL.	Type of oil pump—GEAR.
H. P. draw bar—15.	Make of lubricator.
H. P. belt—25.	Oil circulating indicator in driver's vision.
Normal pull in pounds—	Type of radiator—HONEYCOMB.
Low gear—4200.	Water circulation—PUMP.
Intermediate.	Fan drive—BELT.
High gear—3000.	Ignition—MAGNETO AND IMPULSE STARTER.
Length, inches—136.	Make of ignition system—DIXIE.
Width, inches—74.	Type of governor—CENTRIFUGAL.
Height—62".	Self-starter—CHRISTENSEN.
Outside turning radius, feet—21.	Diameter of belt pulley—18".
Weight with full equipment—6500.	Width of face of belt pulley—8".
Shipping weight—6000.	R.P.M. of belt pulley—475.
Number of wheels—4; 2 front, 2 rear.	Belt speed in feet per minute—2137.5.
Diameter, drive wheels—52".	Pulley drive—GEAR.
Diameter, other wheels—32".	Location of belt pulley—RIGHT SIDE.
Width of face of drive wheels—12".	Transmission clutch—EXPANDING SHOE.
Other wheels—6".	Final drive clutches.
Width of tracks.	Transmission system—SLIDING GEAR.
Length of track on ground.	Miles per hour: Low—1½.
Motor—LAUSON BEAVER.	Intermediate.
Type—VERTICAL.	High—3.
Type of head—VALVE IN HEAD.	Final drive—GEAR.
Number of cylinders—4.	Final drive—ENCLOSED.
Bore—4½". Stroke—6".	Gear metal—B. P. NUTTALL HEAT TREATED.
Normal revolutions per minute—950.	BEARINGS—Ball, Roller, Plain or Oilless.
Number of crank shaft bearings—3.	Transmission—HYATT ROLLER.
Front—3½".	Differential—HYATT ROLLER.
Middle—3½".	Rear axle—HYATT ROLLER.
Rear—4½".	Front axle—TIMKEN ROLLER.
Diameter of crank shaft—2⅝".	Fan—BALL.
Total length of crank shaft bearings—11½".	Pulley—HYATT ROLLER.
Length of connecting-rod bearing—2¼" x 2⅝".	Road clearance—11½".
Number of piston rings for piston—4.	Price F.O.B. factory—\$2095.
Fuel recommended—GAS, DIST., KER.	Price F.O.B. Los Angeles—\$2345.
Make of carburetor—KINGSTON.	San Francisco—\$2345.
Size of carburetor.	
Capacity of priming tank.	
Capacity of fuel tank—2; 15 GALS EACH.	
Make and type of air cleaner—SPECIAL LAUSON DESIGN.	



Fitch Four Drive Tractor Company

Factory: Big Rapids, Michigan

Pacific Coast Distributors:

V. M. Price, 710 Hobart Building, San Francisco, California

Butte and Tehama Counties.....	Gunther Bros., Los Molinos
Glenn and Colusa Counties.....	Turman Bros., Willows
Lassen and San Mateo Counties.....	Poulson Bros., Madeline
Santa Clara, San Benito, Monterey and Santa Cruz Counties.....	
.....	Osen Motor Sales Company, San Jose
Fresno, Tulare and Kings Counties.....	R. Bigelow, Fresno
Arizona.....	Fred Walsh, Glendale
Sacramento, Sutter and Yuba Counties.....	J. Frank Dye, Sacramento

SPECIFICATIONS.

Trade name—FITCH FOUR-DRIVE.

Where made—BIG RAPIDS, MICH.

Type—4-WHEEL.

H. P. draw bar—20.

H. P. belt—36.

Normal pull in pounds—

Low gear—5200.

Intermediate—3200.

High gear—2500.

Length, inches—126.

Width, inches—72.

Height—73".

Wheel base.

Outside turning radius, feet—10.

Weight with full equipment.

Shipping weight—6100.

Number of wheels—4. 2 front, 2 rear.

Diameter, drive wheels—36" and 42".

Diameter, other wheels.

Width of face of drive wheels—12".

Other wheels.

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—CLIMAX.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—4.

Bore—5". Stroke—6½".

Normal revolutions per minute—800.

Number of crank shaft bearings—3.

Front.

Middle.

Rear.

Diameter of crank shaft—3".

Total length of crank shaft bearings—12".

Length of connecting-rod bearing—3".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—KINGSTON.

Size of carburetor.

Capacity of priming tank—2 gallons.

Capacity of fuel tank—28 gallons."

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED and SPLASH
CIRCULATING

Type of oil pump—GEAR.

Make of lubricator.

Oil circulating indicator in driver's vision—
YES

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO and IMPULSE
STARTER

Make of ignition system.

Type of governor—CLIMAX SPECIAL.

Self-starter—NO.

Diameter of belt pulley—14".

Width of face of belt pulley—8".

R. P. M. of belt pulley—600.

Belt speed in feet per minute—2200.

Pulley drive—GEAR.

Location of belt pulley—RIGHT SIDE.

Transmission clutch—DRY PLATE,
MULTIPLE DISC

Final drive clutches—NO.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1½".

Intermediate—2½.

High—4.

Final drive—WORM.

Final drive—ENCLOSED.

Gear metal—CHROME-NICKEL STEEL.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—BALL.

Differential—TIMKEN.

Rear axle—TIMKEN.

Front axle—TIMKEN.

Fan—BALL.

Pulley—PLAIN.

Road clearance—10".

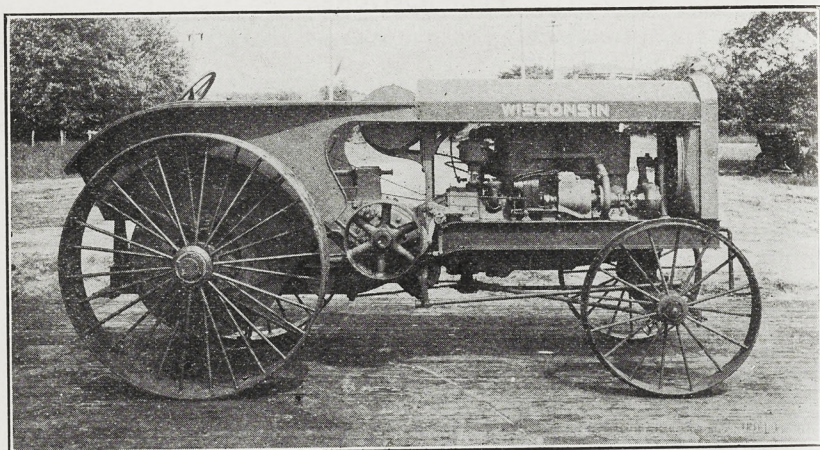
Price F.O.B. factory—\$2820.

Los Angeles—\$2980.

San Francisco—\$2980.

Sacramento—\$2980.

Fresno—\$2980.



Automotive Products Company

E. E. Gerlinger, Factory Representative

112 Market Street, San Francisco, California

WISCONSIN TRACTORS

ONEIDA TRUCKS

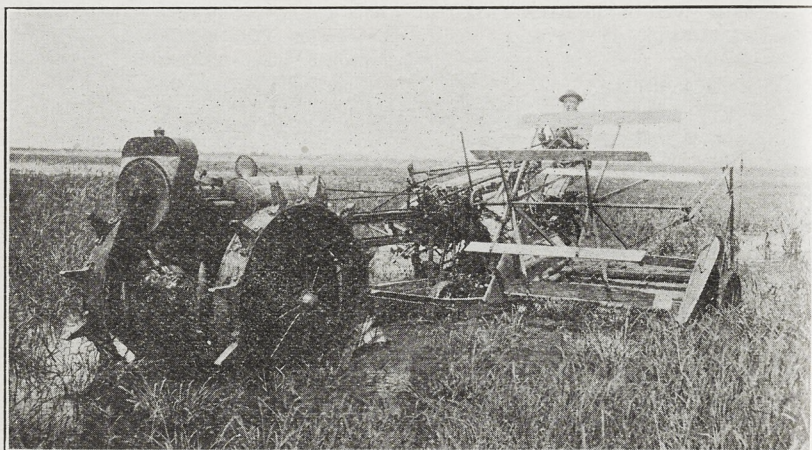
1 Ton	1½ Ton	2 Ton	3½ Ton	6 Ton
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HAWKEY TRUCKS

1 Ton	1½ Ton	2 Ton
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SPECIFICATIONS.

Trade name—WISCONSIN FARM TRACTOR.	Make and type of air cleaner—BENNETT.
Where made—SAUK CITY, WIS.	Lubrication—FORCE FEED.
Type—WHEEL.	Type of oil pump—PLUNGER.
H. P. draw bar—16.	Make of lubricator—CLIMAX.
H. P. belt—32.	Oil circulating indicator in driver's vision—
Normal pull in pounds—	YES
High gear—5200.	Type of radiator—HONEYCOMB.
Intermediate.	Water circulation—PUMP.
Low gear—3000.	Fan drive—BELT.
Length, inches—156.	Ignition—MAGNETO and IMPULSE
Width, inches—66.	STARTER
Height—66".	Make of ignition system—EISEMAN.
Outside turning radius, feet—13.	Type of governor—CLIMAX.
Weight with full equipment—5440.	Self-starter—NO.
Shipping weight—5240.	Diameter of belt pulley—18".
Number of wheels—4.	Width of face of belt pulley—12".
Diameter, drive wheels—52".	R. P. M. of belt pulley—575.
Diameter, other wheels—34".	Belt speed in feet per minute.
Width of face of drive wheels—12".	Pulley drive—DIRECT.
Other wheels—6".	Location of belt pulley—RIGHT SIDE.
Number of tracks.	Transmission clutch—MULTIPLE DISC.
Width of tracks.	Final drive clutches—GEAR.
Length of track on ground.	Transmission system—SELECTIVE.
Motor—CLIMAX.	Miles per hour: Low.
Type—VERTICAL.	Intermediate.
Type of head—"L."	High.
Number of cylinders—4.	Final drive—GEAR.
Bore—5". Stroke—6½".	Final drive—OPEN.
Normal revolutions per minute—800.	Gear metal—CHROME-NICKEL STEEL.
Number of crank shaft bearings—3.	BEARINGS—Ball, Roller, Plain or Oilless
Front—2¼ x 3¾".	Transmission—FOOTE.
Middle—2¼ x 3¾".	Differential—FOOTE.
Rear—2¼ x 4½".	Rear axle—HYATT.
Diameter of crank shaft—2¼".	Front axle—TIMKEN.
Total length of crank shaft bearings—11¾".	Fan—BALL.
Length of connecting-rod bearing—2¼ x 3".	Pulley—GEAR DRIVE.
Number of piston rings for piston—3.	Road clearance—15".
Fuel recommended—KEROSENE.	Price F.O.B. factory—\$2250.
Make of carburetor—STROMBERG.	Los Angeles—\$2500.
Size of carburetor.	San Francisco—\$2500.
Capacity of priming tank.	Sacramento—\$2500.
Capacity of fuel tank—18 gallons.	Fresno—\$2500.



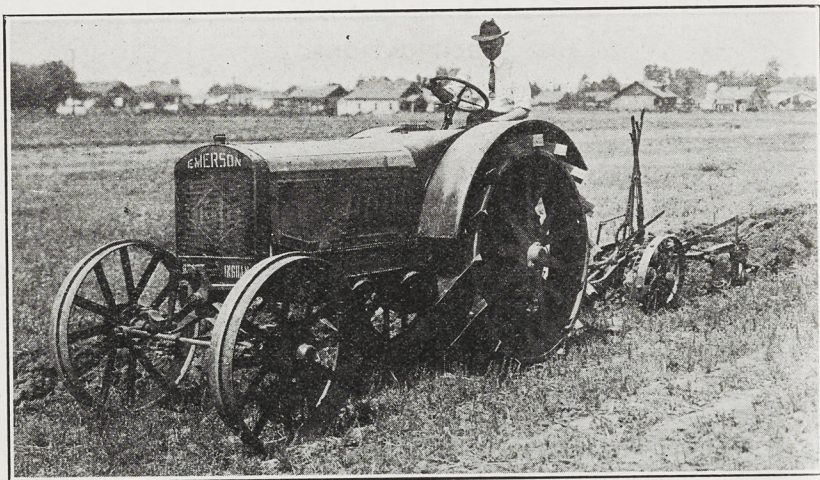
G. B. R. Tractor and Implement Company
Seventh and M Streets, Sacramento, California

Distributors

E. B. TRACTORS
MOLINE TRACTORS
MOLINE IMPLEMENTS

SPECIFICATIONS.

Trade name—MOLINE UNIVERSAL	TRACTOR	Size of carburetor—1½".
Where made—MOLINE, ILL.		Capacity of priming tank.
Type—WHEEL.		Capacity of fuel tank—15 gallons.
H. P. draw bar—9.		Make and type of air cleaner—BENNETT.
H. P. belt—18.		Lubrication—FORCE FEED and SPLASH CIRCULATING
Normal pull in pounds—		Type of oil pump—GEAR.
Low gear.		Make of lubricator.
Intermediate.		Oil circulating indicator in driver's vision—
High gear.		YES
Length, inches—138.		Type of radiator—TUBULAR.
Width, inches—54.		Water circulation—THERMO SYPHON.
Height—67".		Fan drive—BELT.
Outside turning radius, feet—8.		Ignition—BATTERY.
Weight with full equipment.		Make of ignition system—REMY.
Shipping weight—3400.		Type of governor—REMY ELECTRIC.
Number of wheels—2. FRONT DRIVE		Self-starter—REMY.
	WHEEL	Diameter of belt pulley—9".
Diameter, drive wheel—52".		Width of face of belt pulley—6½".
Diameter, other wheels.		R. P. M. of belt pulley—1100.
Width of face of drive wheel—8".		Belt speed in feet per minute—2475
Other wheels.		Pulley drive—GEAR.
Number of tracks.		Location of belt pulley—IN FRONT.
Width of tracks.		Transmission clutch—MULTIPLE DISK, DRY
Length of track on ground.		Final drive clutches.
Motor—MOLINE.		Transmission system—SLIDING GEAR.
Type—VERTICAL.		Miles per hour: Low—1½.
Type of head—"L."		Intermediate.
Number of cylinders—4.		High—8½.
Bore—3½". Stroke—5".		Final drive—GEAR.
Normal revolutions per minute—1200.		Final drive—ENCLOSED.
Number of crank shaft bearings—2.		Gear metal—STEEL.
Front—2½".		BEARINGS—Ball, Roller, Plain or Oilless
Middle.		Transmission—ROLLER BEARINGS.
Rear—3¾".		Differential—ROLLER BEARINGS.
Diameter of crank shaft—2½".		Rear axle.
Total length of crank shaft bearings—5½".		Front axle—ROLLER BEARINGS.
Length of connecting-rod bearing—1¾".		Fan—ROLLER BEARINGS.
Number of piston rings for piston—3.		Pulley—ROLLER BEARINGS.
Fuel recommended—GASOLINE.		Road clearance—29½".
Make of carburetor—HOLLEY.		Price F.O.B. Sacramento—\$1405.



SPECIFICATIONS.

Trade name—EMERSON-BRANTINGHAM.
Where made—ROCKFORD, ILL.

Type—WHEEL.

H. P. draw bar—12 S A E.

H. P. belt—20 S A E.

Normal pull in pounds—

Low gear—3100.

Intermediate.

High gear—2400.

Length, inches—138.

Width, inches—55.

Height—62".

Outside turning radius, feet—8½.

Weight with equipment—4600.

Shipping weight—4375.

Number of wheels—4; 2 FRONT, 2 REAR.

Diameter, drive wheels—54".

Diameter, other wheels—38".

Width of face of drive wheels—12".

Other wheels—6".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—OWN.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—4¾". Stroke—5".

Normal revolutions per minute—900.

Number of crank shaft bearings—3.

Front—3¼".

Middle—3¼".

Rear—4¾".

Diameter of crank shaft—2¼".

Total length of crank shaft bearings—11¼".

Length of connecting-rod bearing—3¼".

Number of piston rings for piston—3.

Fuel recommended—DIST. OR KEROSENE.

Make of carburetor—BENNETT.

Size of carburetor—1¾".

Capacity of priming tank—5 GALS.

Capacity of fuel tank—20 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED AND SPLASH
CIRCULATING.

Type of oil pump—PLUNGER.

Make of lubricator—OWN MAKE.

Oil circulating indicator in driver's vision—
YES.

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—GEAR.

Ignition—MAGNETO AND IMPULSE
STARTER.

Make of ignition system—K. W. H. T.

Type of governor—BALL AND WEIGHT.

Diameter of belt pulley—11".

Width of face of belt pulley—7".

R.P.M. of belt pulley—900.

Belt speed in feet per minute—2591.

Pulley drive—GEAR.

Location of belt pulley—REAR.

Transmission clutch—CONE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1.81.

Intermediate.

High—2½.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—MACHINE CUT, HEAT
TREATED.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—HYATT ROLLER.

Differential—HYATT ROLLER.

Rear axle—HYATT ROLLER.

Front axle—PLAIN.

Fan—BRONZE.

Pulley—HYATT.

Road clearance—14½".

Price F.O.B. factory—\$1630.

Price F.O.B. Los Angeles—\$1725.

San Francisco—\$1725.

Sacramento—1725.

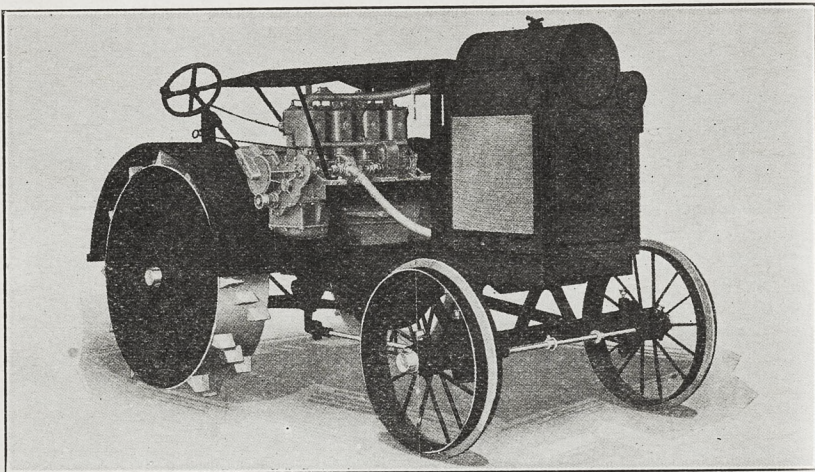
Fresno—\$1725.

Moline Moldboard Plows.**SPECIFICATIONS.**

Trade name and number.....	#3	#10	#21
Number of bottoms.....	2	4	
Width of bottoms.....	12"	10"-12"	10"-12"-14"
Kind of lift.....	Power	Hand	Power
Depth adjustment	Foot lever	Lever	Rope control
Type of beam.....	2-beam unit	3 or 4-beam unit	2, 3, 4, 5, 6 unit
Style of hitch.....	Rigid	Cable	Chain or cable
Type of share.....	Q.D.	Q.D.	Q.D.
Weight	870#	1050-1066#	1100#

Disc Plows.**SPECIFICATIONS.**

Trade name and number.....	#1	#20
Number of discs.....	2	3, 4, 5 or 6
Diameter of discs.....	24"	24"
Width of cut per disc.....	9"	6" or 10"
Kind of lift.....	Power	Power
Style of hitch.....	Rigid	Rigid
Type of disc bearing.....	Chilled	Chilled
Weight	1267#	2500#
Price F.O.B. Sacramento.		



All Work Tractor

Grant and Company, Distributors

Sacramento, California.

SPECIFICATIONS.

Trade name—"ALL WORK."

Where made—QUINCY, ILL.

Type—WHEEL.

H. P. draw bar—15.

H. P. belt—30.

Normal pull in pounds—

Low gear—3800.

Intermediate—3000.

High gear—2200.

Length, inches—125.

Width, inches—76.

Height—69".

Outside turning radius, feet—12.

Weight with full equipment—5400.

Shipping weight—5000.

Number wheels—4.

Diameter, drive wheels—48".

Diameter, other wheels—32".

Width of face of drive wheels—12".

Other wheels—6".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—ALL WORK.

Type—VERTICAL.

Type of head—REMOVABLE "L" HEAD.

Number of cylinders—4.

Bore—5". Stroke—6".

Normal revolutions per minute—800.

Number of crank shaft bearings—5.

Front—3".

Middle—2½".

Rear—3".

Diameter of crank shaft—2¼".

Total length of crank shaft bearings—8½".

Length of connecting-rod bearing—2¼".

Number of piston rings for piston—3.

Fuel recommended—GAS, DIST., KER.

Make of carburetor—KINGSTON.

Size of carburetor.

Capacity of priming tank.

Capacity of fuel tank—20 GALS.

Make and type of air cleaner.

Lubrication—FORCE FEED AND SPLASH
CIRCULATING.

Type of oil pump—PLUNGER.

Make of lubricator.

Oil circulating indicator in driver's vision—
YES.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO AND IMPULSE
STARTER.

Make of ignition system—KINGSTON.

Type of governor—FLY-BALL.

Self-starter.

Diameter of belt pulley—12"

Width of face of belt pulley—7".

R.P.M. of belt pulley—800.

Belt speed in feet per minute.

Pulley drive—DIRECT.

Location of belt pulley—CRANK SHAFT.

Transmission clutch—EXPANDING SHOE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1¼.

Intermediate—2½.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—BALL.

Differential—ROLLER.

Rear axle—ROLLER.

Front axle—ROLLER.

Fan—BALL.

Pulley.

Road clearance—26".

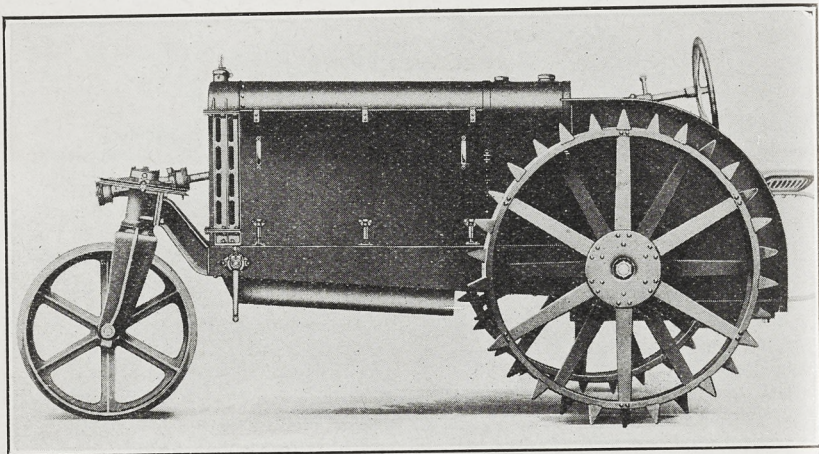
Price F.O.B. San Francisco—\$1750.

Sacramento—\$1750.

Fresno—\$1750.

SPECIFICATIONS.

Trade name—"ALL WORK."	Capacity of fuel tank—15 gallons.
Where made—QUINCY, ILL.	Make and type of air cleaner—BENNETT.
Type—WHEEL.	Lubrication—FORCE FEED.
H. P. draw bar—12.	Type of oil pump—PLUNGER.
H. P. belt—25.	Make of lubricator.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—3000.	YES
Intermediate—2300.	
High gear—1800.	Type of radiator—HONEYCOMB.
Length, inches—111.	Water circulation—PUMP.
Width, inches—50.	Fan drive—BELT.
Height—52".	Ignition—MAGNETO and IMPULSE
Outside turning radius, feet—10.	STARTER
Weight with full equipment.	Make of ignition system—KINGSTON.
Shipping weight—4100.	Type of governor—FLY-BALL.
Number of wheels—4.	Self-starter.
Diameter, drive wheels—42".	Diameter of belt pulley—8".
Diameter, other wheels—28".	Width of face of belt pulley—6".
Width of face of drive wheels—10".	R. P. M. of belt pulley—900.
Other wheels—4".	Belt speed in feet per minute.
Number of tracks.	Pulley drive—DIRECT.
Width of tracks.	Location of belt pulley—SIDE.
Length of track on ground.	Transmission clutch—FRICTION DISC.
Motor—ALL WORK.	Final drive clutches.
Type—VERTICAL.	Transmission system—SLIDING GEAR.
Type of head—"L."	Miles per hour: Low—1.75.
Number of cylinders—4.	Intermediate—2.4.
Bore—4". Stroke—6".	High—3.8.
Normal revolutions per minute—900.	Final drive—GEAR.
Number of crank shaft bearings—5.	Final drive—ENCLOSED.
Front—3".	Gear metal—STEEL.
Middle—2½".	BEARINGS—Ball, Roller, Plain or Oilless
Rear—3".	Transmission—BALL.
Diameter of crank shaft—2¼".	Differential—TIMKEN.
Total length of crank shaft bearings—8½".	Rear axle—TIMKEN.
Length of connecting-rod bearing—2¼".	Front axle—ROLLER.
Number of piston rings for piston—3.	Fan—BALL.
Fuel recommended—GAS., DIST., KER.	Pulley—BALL.
Make of carburetor—KINGSTON.	Road clearance—17".
Size of carburetor.	Price F.O.B. San Francisco—\$1475.
Capacity of priming tank.	Sacramento—\$1475.
	Fresno—\$1475.



Grissel Brothers.

Distributors

311 North Eldorado Street, Stockton, California.

VICTORY TRACTOR

SPECIFICATIONS.

Trade name—VICTORY.
 Where made—GREENSBURG, IND.
 Type—WHEEL.
 H. P. draw bar—15.
 H. P. belt—30.
 Normal pull in pounds—
 Low gear.
 Intermediate.
 High gear.
 Length, inches—130.
 Width, inches—72.
 Height—54".
 Outside turning radius, feet—8.
 Weight with full equipment—3500.
 Shipping weight.
 Number wheels—3; 1 FRONT, 2 REAR.
 Diameter, drive wheels—38".
 Diameter, other wheels—30".
 Width of face of drive wheels—12".
 Other wheels—7".
 Number of tracks.
 Width of tracks.
 Length of track on ground.
 Motor—WAUKESHA.
 Type—VERTICAL.
 Type of head—"L".
 Number of cylinders—4.
 Bore—4½". Stroke—5½".
 Normal revolutions per minute—950.
 Number of crank shaft bearings—3.
 Front—3¼".
 Middle—2¼".
 Rear—3¼".
 Diameter of crank shaft—2".
 Total length of crank shaft bearings—9¼".
 Length of connecting-rod bearing—2½".
 Number of piston rings for piston—3.
 Fuel recommended—DISTILLATE.
 Make of carburetor—CARTER.
 Size of carburetor.
 Capacity of priming tank.

Capacity of fuel tank—25 GALS.
 Make and type of air cleaner—BENNETT.
 Lubrication—FORCE FEED AND SPLASH CIRCULATING.

Type of oil pump—GEAR.
 Make of lubricator.
 Type of radiator—HONEYCOMB.
 Water circulation—PUMP.
 Fan drive—BELT.
 Ignition—MAGNETO AND IMPULSE STARTER.

Make of ignition system—DIXIE.
 Type of governor—PIERCE.
 Self-starter.
 Diameter of belt pulley—10".
 Width of face of belt pulley—5½".
 R.P.M. of belt pulley.
 Belt speed in feet per minute—2600.
 Pulley drive—GEAR.
 Location of belt pulley—RIGHT SIDE.
 Transmission clutch—MULTIPLE DISK.
 Final drive clutches—LOCKING BRAKE ON EACH REAR WHEEL.

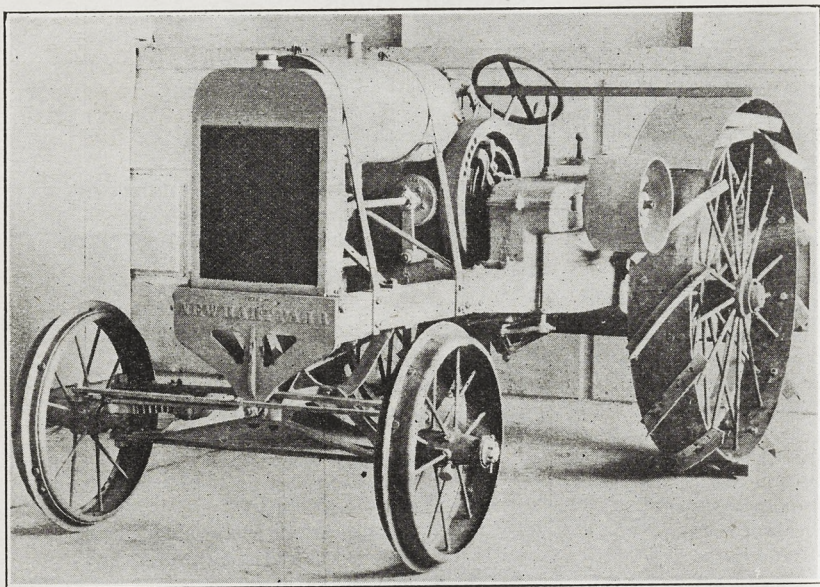
Transmission system—SLIDING GEAR.
 Miles per hour: Low—1½ TO 2½.
 Intermediate.
 High—3½ TO 5.
 Final drive—GEAR, WORM.
 Final drive—ENCLOSED.
 Gear metal—CUT STEEL AND CASE HARDENED.

BEARINGS—Ball, Roller, Plain or Oilless.
 Transmission—HYATT ROLLER.
 Differential—HYATT ROLLER.
 Rear axle—HYATT ROLLER.
 Front axle.
 Fan—ROLLER BEARING.
 Pulley.
 Road clearance—16".
 Price F.O.B. factory—\$1790.
 Price F.O.B. California—\$1875.

SPECIFICATIONS.

Trade name—VICTORY.
Where made—GREENSBURG, IND.
Type—WHEEL.
H. P. draw bar—9.
H. P. Belt—18.
Normal pull in pounds.
 Low gear.
 Intermediate.
 High gear.
Length, inches—130.
Width, inches—72.
Height—54".
Outside turning radius, feet—8.
Weight with full equipment.
Shipping weight—3200.
Number of wheels—3; 1 FRONT, 2 REAR.
Diameter, drive wheels—48".
Diameter, other wheels—30".
Width of face of drive wheels—12".
 Other wheels—7".
Number of tracks.
Width of tracks.
Length of track on ground.
Motor—GRAY.
Type—VERTICAL.
Type of head—VALVE IN HEAD.
Number of cylinders—4.
 Bore—3½". Stroke—5".
Normal revolutions per minute—1050.
Number of crank shaft bearings—3.
 Front—2½".
 Middle—2".
 Rear—3".
Diameter of crank shaft—1½".
Total length of crank shaft bearings—7½".
Length of connecting-rod bearing—2".
Number of piston rings for piston—3.
Fuel recommended—DISTILLATE.
Make of carburetor—CARTER.
Size of carburetor.
Capacity of priming tank.

Capacity of fuel tank—25 GALs.
Make and type of air cleaner—BENNETT.
Lubrication—FORCE FEED AND SPLASH CIRCULATING.
Type of oil pump—GEAR.
Make of lubricator.
Oil circulating indicator in driver's vision.
Type of radiator—HONEYCOMB.
Water circulation—THERMO SYPHON.
Fan drive—BELT.
Ignition—MAGNETO AND IMPULSE STARTER.
Make of ignition system—DIXIE.
Type of governor—PIERCE.
Self-starter.
Diameter of belt pulley—10".
Width of face of belt pulley—5½".
R.P.M. of belt pulley.
Belt speed in feet per minute—2600.
Pulley drive—GEAR.
Location of belt pulley—RIGHT SIDE.
Transmission clutch—MULTIPLE DISK.
Final drive clutches.
Transmission system—SLIDING GEAR.
Miles per hour: Low—1½ TO 2.
Intermediate.
High—3½ TO 5.
Final drive—GEAR; WORM.
Final drive—ENCLOSED.
Gear metal—CUT STEEL AND CASE HARDENED.
BEARINGS—Ball, Roller, Plain or Oilless.
Transmission—HYATT ROLLER.
Differential—HYATT ROLLER.
Rear axle—HYATT ROLLER.
Front axle.
Fan—ROLLER BEARING.
Pulley.
Road clearance—16".
Price F.O.B. factory—\$1470.
Price F.O.B. California—\$1550.



The New Hart-Parr "30"

Hart-Parr Company, Charles City, Iowa

Pacific Coast Factory Representative:

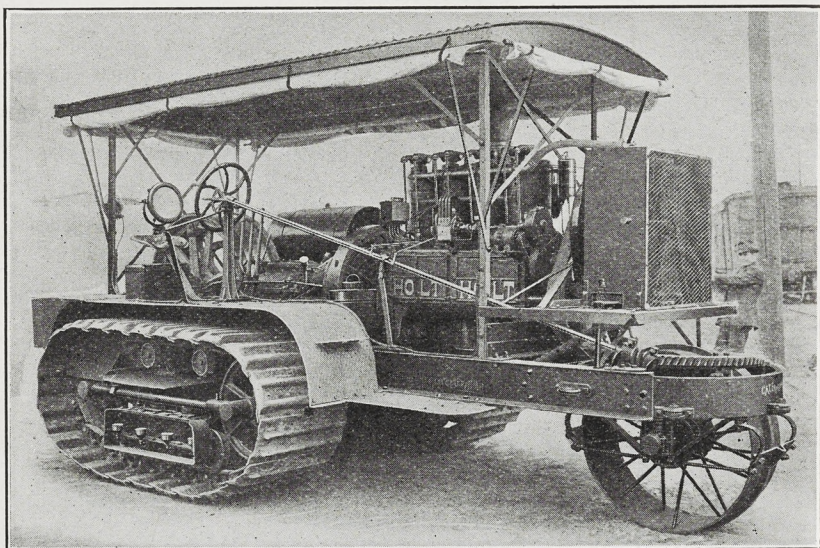
Neal Weaver, 1650 California Street, San Francisco, California.

Southern California Distributor:

Southern Border Motor Company, Los Angeles, California.

SPECIFICATIONS.

Trade name—NEW HART-PARR.	Make and type of air cleaner—PERISCOPE.
Where made—CHARLES CITY, IOWA.	Lubrication—FORCE FEED, FRESH OIL,
Type—WHEEL.	SPLASH CIRCULATING.
H. P. draw bar—15.	Type of oil pump—FORCE FEED.
H. P. belt—30.	Make of lubricator—MADISON-KIPP.
Normal pull in pounds—	Oil circulating indicator in driver's vision—
Low gear—3900.	YES.
Intermediate.	Type of radiator—TUBULAR.
High gear—2600.	Water circulation—PUMP, SHAFT DRIVEN.
Length, inches—141.	Fan drive—GEAR SHAFT.
Width, inches—83.	Ignition—MAGNETO AND IMPULSE
Height—61".	STARTER.
Outside turning radius, feet—13.	Make of ignition system—K. W.
Weight with full equipment—5158.	Type of governor—NEW HART-PARR.
Shipping weight—5158.	Diameter of belt pulley—14".
Number of wheels—4.	Width of face of belt pulley—8".
Diameter, drive wheels—52".	R.P.M. of belt pulley—750.
Diameter, other wheels—28".	Belt speed in feet per minute—2750.
Width of face of drive wheels—10".	Pulley drive—DIRECT.
Other wheels—5".	Location of belt pulley—LEFT SIDE.
Number of tracks.	Transmission clutch—CONTRACTING BAND.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING GEAR.
Motor—NEW HART-PARR.	Miles per hour: Low—2.
Type—HORIZONTAL.	Intermediate.
Type of head—VALVE IN HEAD.	High—3.
Number of cylinders—2.	Final drive—GEAR.
Bore—6½". Stroke—7".	Final drive—OPEN.
Normal revolutions per minute—750.	Gear metal—SEMI-STEEL.
Number of crank shaft bearings—2.	BEARINGS—Ball, Roller, Plain or Oilless.
Front—5½".	Transmission—S.K.F. and HYATT ROLLER.
Middle.	Differential—S.K.F. BALL.
Rear—5½".	Rear axle—BABBITT.
Diameter of crank shaft—2½".	Front axle—BABBITT.
Total length of crank shaft bearings—11".	Fan—S.K.F. BALL.
Length of connecting-rod bearing—3½".	Pulley—S.K.F. BALL.
Number of piston rings for piston—4.	Road clearance.
Fuel recommended—KEROSENE.	Price F.O.B. factory—\$1395.
Make of carburetor—SCHEBLER.	Price F.O.B. Los Angeles—\$1550.
Size of carburetor—1½".	San Francisco—\$1550.
Capacity of priming tank—1 GAL.	Sacramento—\$1550.
Capacity of fuel tank—23 GALS.	Fresno—\$1550.



The Holt Manufacturing Company

Stockton, California

Spokane, Washington

Peoria, Illinois

Los Angeles, California

San Francisco, California

50 Church Street, New York City

Canadian Holt Company, Ltd., Calgary, Alberta, Canada

Caterpillar Tractors, Ltd., London, England

Representation in every part of the world

"CATERPILLAR" TRACTORS

"CATERPILLAR" COMBINED HARVESTERS

"CATERPILLAR" PLOWS

(Disc and Moldboard)

"CATERPILLAR" DISC HARROWS

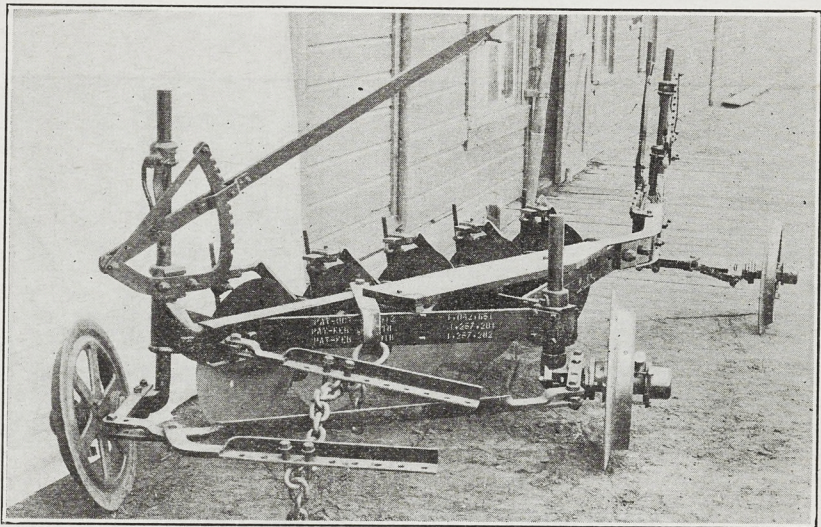
"CATERPILLAR" LAND LEVELERS

SPECIFICATIONS.

Trade name—CATERPILLAR.	Capacity of priming tank.
Where made—STOCKTON, CALIF.	Capacity of fuel tank—48 GALS.
Type—TRACK.	Make and type of air cleaner—DONALDSON.
H. P. draw bar—22.	Lubrication—SPLASH CIRCULATING.
H. P. belt—45.	Type of oil pump—GEAR.
Normal pull in pounds—	Make of lubricator—MANZEL.
Low gear.	Oil circulating indicator in driver's vision—
Intermediate.	YES.
High gear.	Type of radiator—TUBULAR.
Length, inches—153.	Water circulation—PUMP CENTRIFUGAL.
Width, inches—96.	Fan drive—BELT.
Height, 6' 4½".	Ignition—MAGNETO AND IMPULSE
Outside turning radius, feet—17.	STARTER.
Weight with full equipment—18,300.	Make of ignition system—K. W.
Shipping weight—18,200.	Type of governor—BALL.
Number of wheels.	Self-starter.
Diameter, drive wheels.	Diameter of belt pulley—14".
Diameter, other wheels.	Width of face of belt pulley—8".
Width of face of drive wheels.	R.P.M. of belt pulley—625.
Other wheels.	Belt speed in feet per minute—2187.5.
Number of tracks—2.	Pulley drive—GEAR.
Width of tracks—24".	Location of belt pulley—FRONT.
Length of track on ground—6' 10".	Transmission clutch—5-PLATE.
Motor—CATERPILLAR.	Final drive clutches—CONE.
Type—VERTICAL.	Transmission system.
Type of head—VALVE IN HEAD.	Miles per hour: Low—1.45.
Number of cylinders—4.	High—2.17.
Bore—6". Stroke—7".	Final drive—GEAR.
Normal revolutions per minute—600.	Final drive—ENCLOSED.
Number of crank shaft bearings—5.	Gear metal—STEEL.
Front—5½".	BEARINGS—Ball, Roller, Plain or Oilless.
Middle—3¼".	Transmission—PLAIN.
Rear—7½".	Differential.
Diameter of crank shaft—2 13/16".	Rear axle—PLAIN.
Total length of crank shaft bearings—22¾".	Front axle—PLAIN.
Length of connecting-rod bearing—3¼".	Fan—PLAIN.
Number of piston rings for piston—3.	Pulley—PLAIN.
Fuel recommended—DISTILLATE.	Road clearance.
Make of carburetor—SCHEBLER.	Price F.O.B. factory—\$5000.
Size of carburetor—1½".	

SPECIFICATIONS.

Trade name—CATERPILLAR.	Size of carburetor—2".
Where made—STOCKTON, CALIF.	Capacity of priming tank.
Type—TRACK.	Capacity of fuel tank—78 GALS.
H. P. draw bar—38.	Make and type of air cleaner—DONALDSON.
H. P. belt—75.	Lubrication—SPLASH CIRCULATING.
Normal pull in pounds—	Type of oil pump—GEAR.
Low gear.	Make of lubricator—MANZEL.
Intermediate.	Oil circulating indicator in driver's vision—
High gear.	YES.
Length, inches—228.	Type of radiator—TUBULAR.
Width, inches—114.	Water circulation—PUMP.
Height—90".	Fan drive—BELT.
Outside turning radius, feet—20.	Ignition—MAGNETO AND IMPULSE
Weight with full equipment—24,500.	STARTER.
Shipping weight—24,300.	Make of ignition system—K. W.
Number of wheels.	Type of governor—FLY-BALL.
Diameter, drive wheels.	Diameter of belt pulley—14" TO 32".
Diameter, other wheels—FRONT WHEEL 39".	Width of face of belt pulley—10".
Width of face of drive wheels.	R.P.M. of belt pulley—362.
Other wheels—FRONT 16".	Belt speed in feet per minute.
Number of tracks—2.	Pulley drive—GEAR.
Width of tracks—30".	Location of belt pulley—SIDE.
Length of track on ground—5' 9".	Transmission clutch—DRY PLATE.
Motor—CATERPILLAR.	Final drive clutches—EXPANDING BAND.
Type—VERTICAL.	Transmission system—SLIDING GEAR.
Type of head—VALVE IN HEAD.	Miles per hour: Low—1.5.
Number of cylinders—4.	Intermediate.
Bore—7½". Stroke—8".	Direct high—2.235.
Normal revolutions per minute—550.	Final drive—CHAIN.
Number of crank shaft bearings—5.	Final drive—ENCLOSED.
Front—5½".	Gear metal—CAST IRON; CAST STEEL.
Middle—3 11/16".	BEARINGS—Ball, Roller, Plain or Oilless.
Rear—8".	Transmission—PLAIN.
Diameter of crank shaft—3½".	Differential.
Total length of crank shaft bearings—	Rear axle—PLAIN.
24 13/16".	Front axle—PLAIN.
Length of connecting-rod bearing—3 15/16".	Fran—PLAIN.
Number of piston rings for piston—3.	Pulley.
Fuel recommended—DISTILLATE.	Road clearance—7".
Make of carburetor—SCHEBLER.	Price F.O.B. factory—\$6600.

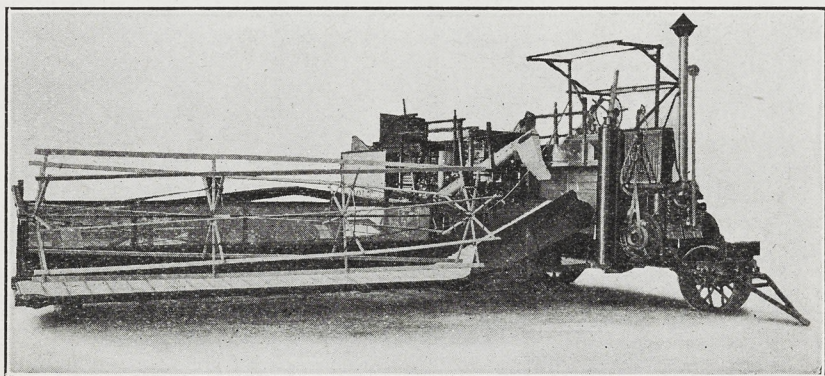


Holt Manufacturing Company Disc Plows.

Trade name and number.....	<i>Light Caterpillar</i>	<i>Heavy Caterpillar</i>
No. of discs	5	5
Diameter of discs	26" or 28"	26" or 28"
Width of cut per disc.....	10"	10"
Kind of lift.....	Lever	Gear or hand wheel
Style of hitch.....	Chain	Chain
Type of disc bearing.....	Chilled	Chilled
Weight	3100 lbs.	4260 lbs.
Price f. o. b. Stockton.....	\$410.00	\$540.00

Holt Manufacturing Company Moldboard Plows (Combination).

Trade name and number.....	<i>Caterpillar</i>
No. of bottoms.....	4
Width of bottoms.....	14
Kind of lift	Hand
Depth Adjustment	Lever
Type of beam.....	I beam
Style of hitch.....	Chain
Type of share.....	Q. D.
Weight	3100 lbs.
Price f. o. b. Sacramento.....	\$510.00



“Caterpillar” Combined Harvesters

SPECIFICATIONS.

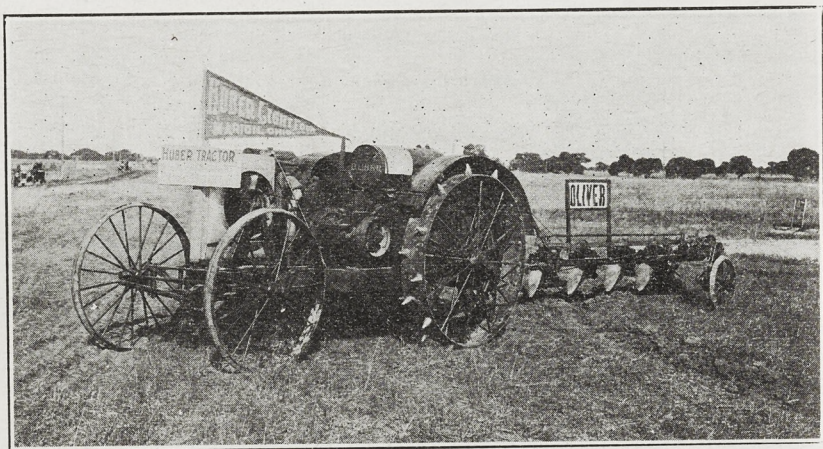
R. P. M.	600
Stroke	7"
Bore	6"
Cylinders	4
Horsepower	45

Capacity	40 to 60 acres per day
Power required	16 to 20 horses
Main wheels	20"
	2 tracks
	2 tracks

Cut	16', 18', 20'
	24'
	118"
Draper	44"
	52"
	52"
Separator	44"
	50"
	50"
Cylinder	30"
	40"
	40"

California Special (side-hill)
Giant (grain) -----
Giant (bean) -----

Regular Standard—Same as California Special but for level land only.
Regular Standard and California Special can be furnished without motor provided with ground-drive if desired. Giant with motor only.

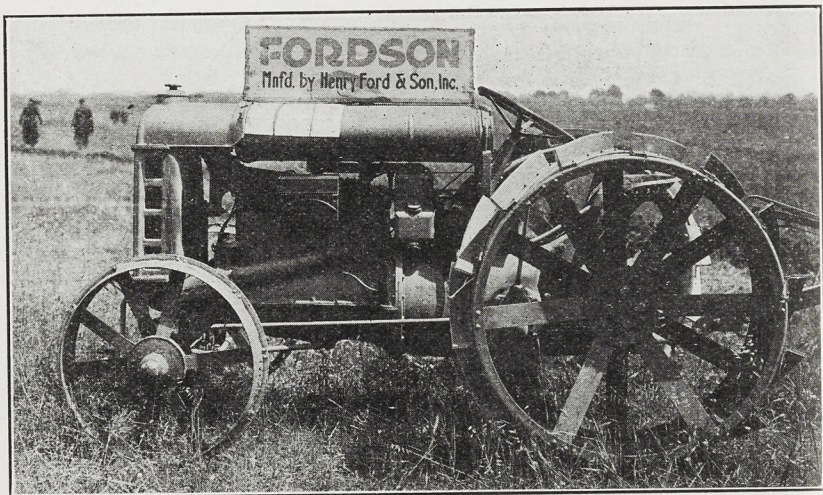


The Huber Light Four
THE HUBER MANUFACTURING COMPANY
Marion, Ohio

THE HUBER TRACTOR SALES COMPANY
1012-14 South Los Angeles Street, Los Angeles, California

SPECIFICATIONS.

Trade name—HUBER LIGHT 4.	Make and type of air cleaner—BENNETT.
Where made—MARION, OHIO.	Lubrication—CIRCULATING SPLASH.
Type—WHEEL.	Type of oil pump—GEAR.
H. P. draw bar—12.	Make of lubricator—WAUKESHA.
H. P. belt—25.	Oil circulating indicator in driver's vision—
Normal pull in pounds—	YES
Low gear—2500.	Type of radiator—CELLULAR.
Intermediate.	Water circulation—PUMP.
High gear.	Fan drive—BELT.
Length, inches—150.	Ignition—MAGNETO and IMPULSE
Width, inches—80½.	STARTER
Height—69.	Make of ignition system—KINGSTON.
Outside turning radius, feet—12.	Type of governor—CENTRIFUGAL.
Weight with full equipment—5300.	Diameter of belt pulley—13".
Shipping weight—5000.	Width of face of belt pulley—7".
Number wheels—4.	R. P. M. of belt pulley—900.
Diameter, drive wheels—60".	Belt speed in feet per minute—2827.
Diameter, other wheels—46".	Pulley drive—DIRECT.
Width of face of drive wheels—10".	Location of belt pulley—LEFT.
Other wheels—4".	Transmission clutch—EXPANDING SHOE.
Number of tracks.	Final drive clutches—NONE.
Width of tracks.	Transmission system—SLIDING GEAR.
Length of track on ground.	Miles per hour: Low—2½.
Motor—WAUKESHA.	Intermediate.
Type—VERTICAL.	High—3½.
Type of head—"L."	Final drive—BULL GEAR.
Number of cylinders—4.	Final drive—OPEN.
Bore—4¼". Stroke—5¾".	Gear metal—STEEL.
Normal revolutions per minute—900.	BEARINGS—Ball, Roller, Plain or Oilless
Number of crank shaft bearings—3.	Transmission—BALL AND ROLLER.
Front.	Differential.
Middle.	Rear axle—PLAIN.
Rear.	Front axle—PLAIN.
Diameter of crank shaft—1¼".	Fan—ROLLER.
Total length of crank shaft bearings—9 3/16".	Pulley—HYATT.
Length of connecting-rod bearing.	Road clearance—17".
Number of piston rings for piston—3.	Price F.O.B. factory.
Fuel recommended—GAS., DIST.	Los Angeles.
Make of carburetor—KINGSTON.	San Francisco.
Size of carburetor—1¼".	Sacramento.
Capacity of priming tank—3 gallons.	Fresno.
Capacity of fuel tank—21½ gallons.	



William L. Hughson Company

Van Ness Avenue and Geary Street, San Francisco, California

Fordson Tractors

Oliver Implements

Roderick Lean Harrows

Amsco Seed Drills

Culti-Packers

Knapp Orchard Disc Plows

Federal Motor Trucks:

1 Ton Model SD

1½ Ton Model TD

2 Ton Model UD

3½ Ton Model WC

5 Ton Model XC

Lee Line Equipment:

Trailers

Loaders

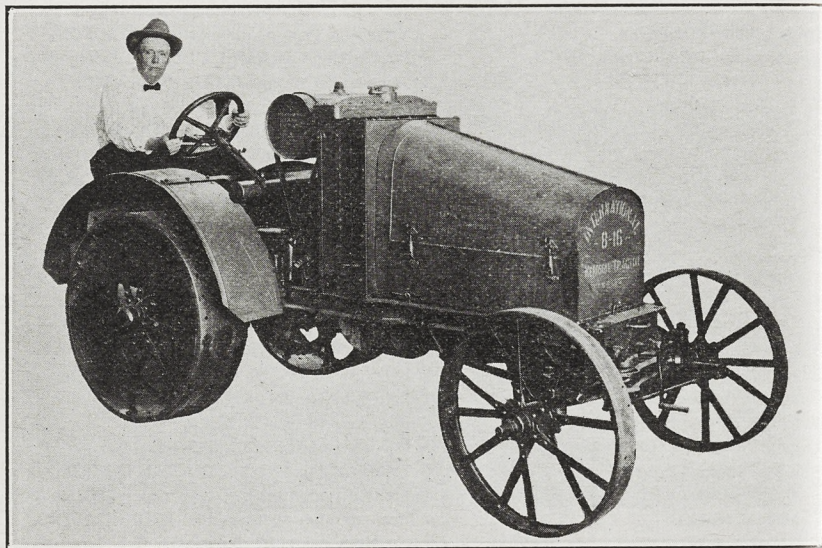
Bodies

Industrial Trailers

Industrial Bodies

SPECIFICATIONS.

- Trade name—FORDSON.
 Where made—DEARBORN, MICH.
 Type—4-WHEEL.
 H. P. draw bar—12.
 H. P. belt—20.
 Normal pull in pounds—
 Low gear—2500.
 Intermediate—1800.
 High gear.
 Length, inches.
 Width, inches—62.
 Height.
 Outside turning radius, feet—12.
 Weight with full equipment—2700.
 Shipping weight—2500.
 Number of wheels—4.
 Diameter, drive wheels—42".
 Diameter, other wheels.
 Width of face of drive wheels—12".
 Other wheels.
 Number of tracks.
 Width of tracks.
 Length of track on ground.
 Motor—FORDSON.
 Type—VERTICAL.
 Type of head—"L."
 Number of cylinders—4.
 Bore—4". Stroke—5".
 Normal revolutions per minute—1000.
 Number of crank shaft bearings—3.
 Front—3".
 Middle—3".
 Rear—3½".
 Diameter of crank shaft—2 1/16".
 Total length of crank shaft bearings—9¼".
 Length of connecting-rod bearing—2¼".
 Number of piston rings for piston—3.
 Fuel recommended—KEROSENE.
 Make of carburetor—HOLLEY.
 Size of carburetor.
 Capacity of priming tank—1 gallon.
 Capacity of fuel tank—21 gallons.
- Make and type of air cleaner—FORDSON.
 Lubrication—SPLASH CIRCULATING.
 Type of oil pump—GEAR, PLUNGER.
 Make of lubricator.
 Oil circulating indicator in driver's vision.
 Type of radiator—TUBULAR, VERTICAL.
 Water circulation—THERMO SYPHON.
 Fan drive—GEAR, BELT.
 Ignition—SPECIAL DESIGN.
 Make of ignition system—FORDSON.
 Type of governor.
 Self-starter—NO.
 Diameter of belt pulley—9½".
 Width of face of belt pulley—6½".
 R. P. M. of belt pulley—1000.
 Belt speed in feet per minute—9500.
 Pulley drive—DIRECT.
 Location of belt pulley—SIDE.
 Transmission clutch—MULTIPLE DISC.
 Final drive clutches.
 Transmission system—FORDSON SLIDING.
 Miles per hour: Low—1½.
 Intermediate—2¾.
 High—6¾.
 Final drive—WORM.
 Final drive—ENCLOSED.
 Gear metal—VANADIUM STEEL.
 BEARINGS—Ball, Roller, Plain or Oilless
 Transmission—BALL.
 Differential—BALL.
 Rear axle—ROLLER.
 Front axle—BALL.
 Fan—BALL.
 Pulley—BALL.
 Road clearance—13".
 Price F.O.B. factory—\$750.
 Los Angeles—\$835.
 San Francisco—\$835.
 Sacramento—\$835.
 Fresno—\$835.



**International Harvester Company of America,
Incorporated
Farm Operating Equipment**

MCCORMICK INTERNATIONAL DEERING

San Francisco Branch: W. G. Criswell, Manager

201 Potrero Avenue

Price F.O.B. factory—\$925.

SPECIFICATIONS.

Trade name—INTERNATIONAL.

Where made—CHICAGO, ILL.

Type—WHEEL.

H. P. draw bar—15.

H. P. belt—30.

Normal pull in pounds—

Low gear—3125.

Intermediate.

High gear—2350.

Length, inches—160.

Width, inches—80.

Height—118".

Wheel base.

Outside turning radius, feet—19.

Weight with full equipment—9200.

Shipping weight—8700.

Number of wheels—4.

Diameter, drive wheels—66".

Diameter, other wheels—40".

Width of face of drive wheels—14".

Other wheels—7".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—OWN.

Type—HORIZONTAL.

Type of head—VALVE IN HEAD.

Number of cylinders—4.

Bore—5¼". Stroke—8".

Normal revolutions per minute—575.

Number of crank shaft bearings—3.

Front—5¾".

Middle—5¾".

Rear—5¾".

Diameter of crank shaft—25".

Total length of crank shaft bearings—16¾".

Length of connecting-rod bearing—2¾".

Number of piston rings for piston—4.

Fuel recommended—DIST., KER.

Make of carburetor—OWN.

Size of carburetor.

Capacity of priming tank.

Capacity of fuel tank—24 gallons.

Make and type of air cleaner.

Lubrication—FORCE FEED and SPLASH
CIRCULATING

Type of oil pump—GEAR.

Make of lubricator—MADISON-KIPP.

Oil circulating indicator in driver's vision.

Type of radiator: TUBULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO and IMPULSE

STARTER

Make of ignition system—K. W.

Type of governor—FLY-BALL.

Diameter of belt pulley—18".

Width of face of belt pulley—9".

R. P. M. of belt pulley—575.

Belt speed in feet per minute—2000.

Pulley drive—DIRECT.

Location of belt pulley—RIGHT-HAND SIDE.

Transmission clutch—CONTRACTING BAND.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1.8.

Intermediate.

High—2.4.

Final drive—CHAIN.

Final drive—ENCLOSED.

Gear metal.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—ROLLER.

Differential—ROLLER.

Rear axle—ROLLER.

Front axle—ROLLER.

Fan—PHOSPHOR BRONZE.

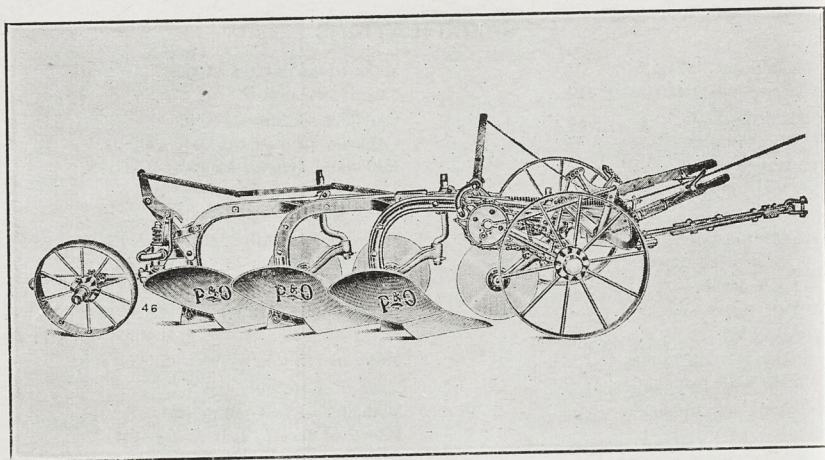
Pulley.

Road clearance.

Price F.O.B. factory—\$1900.

SPECIFICATIONS.

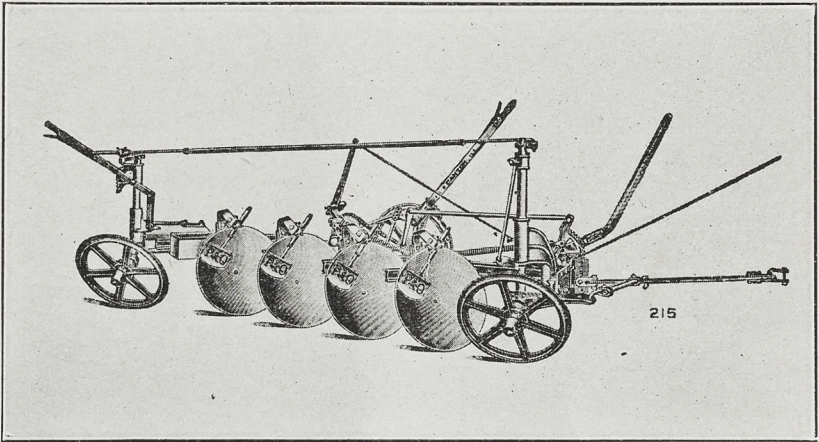
Trade name—TITAN.	Make of carburetor—OWN.
Where made—CHICAGO, ILL.	Size of carburetor.
Type—WHEEL.	Capacity of priming tank.
H. P. draw bar—10.	Capacity of fuel tank—16 gallons.
H. P. belt—20.	Make and type of air cleaner—OWN.
Normal pull in pounds—	Lubrication—FORCE FEED.
Low gear.	Type of oil pump—GEAR.
Intermediate.	Make of lubricator—MADISON-KIPP.
High gear—1000.	Type of radiator—HONEYCOMB.
Length, inches—147.	Water circulation—THERMO SYPHON.
Width, inches—60.	Ignition—MAGNETO and IMPULSE
Height—33 $\frac{1}{4}$ ".	STARTER
Outside turning radius, feet—14.	Make of ignition system—K. W.
Weight with full equipment.	Type of governor—OWN.
Shipping weight—5710.	Diameter of belt pulley—20".
Number of wheels—4.	Width of face of belt pulley—9 $\frac{1}{2}$ ".
Diameter, drive wheels—54".	R. P. M. of belt pulley—500.
Diameter, other wheels—36".	Belt speed in feet per minute—2000.
Width of face of drive wheels—10".	Pulley drive—DIRECT.
Other wheels—6".	Location of belt pulley—RIGHT-HAND SIDE.
Number of tracks.	Transmission clutch—CONTRACTING BAND.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING GEAR.
Motor—OWN.	Miles per hour: Low—1.85.
Type—HORIZONTAL.	Intermediate.
Type of head—VALVE IN HEAD.	High—2.5.
Number of cylinders—2.	Final drive—CHAIN.
Bore—6 $\frac{1}{2}$ ". Stroke—8".	Final drive—OPEN.
Normal revolutions per minute—500.	Gear metal.
Number of crank shaft bearings—2.	BEARINGS—Ball, Roller, Plain or Oilless
Front—6 $\frac{5}{8}$ ".	Transmission—ROLLER.
Middle.	Differential—PHOSPHOR BRONZE.
Rear—6 $\frac{5}{8}$ ".	Rear axle—ROLLER.
Diameter of crank shaft—3 $\frac{1}{4}$ ".	Front axle—ROLLER.
Total length of crank shaft bearings—13 $\frac{3}{4}$ ".	Fan—PHOSPHOR BRONZE.
Length of connecting-rod bearings—2 $\frac{3}{4}$ ".	Pulley.
Number of piston rings for piston—4.	Road clearance.
Fuel recommended—DIST., KER.	Price F.O.B. factory—\$1000.



International Harvester Company

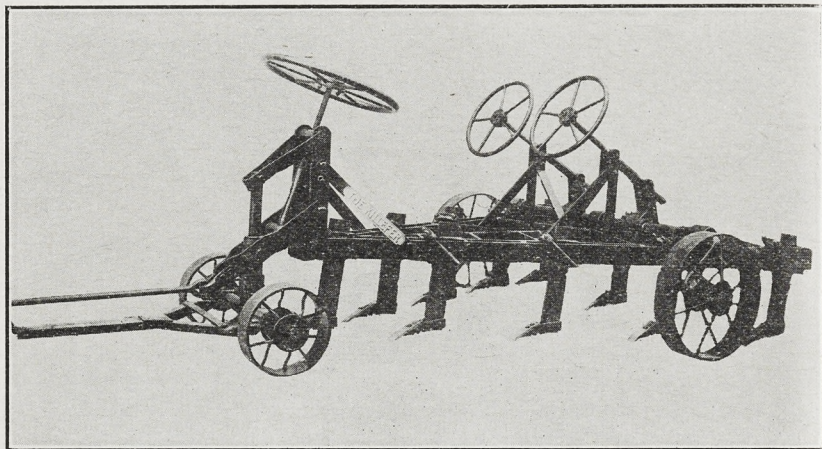
P. and O. Plows—Mold Board.

Trade name and number	<i>Little Genius No. 5 P. and O. No. 4</i>	
No. of bottoms	3	4
Width of bottoms	12"	10"
Kind of lift	Power	Power
Depth adjustment	Lever	Lever
Type of beam	Rigid	Rigid
Type of share	Q. D.	Q. D.
Weight	1160 lbs.	1400 lbs.
Price f. o. b. Sacramento		



P. and O. Disc Plows.

Trade name and number.....	<i>P. and O. No. 1</i>
No. of discs.....	4
Diameter of discs.....	26"
Width of cut per disc.....	9"
Kind of lift.....	Power
Style of hitch.....	Rigid
Type of disc bearing.....	Chilled
Weight	1700 lbs.
Price f. o. b. Sacramento.....	



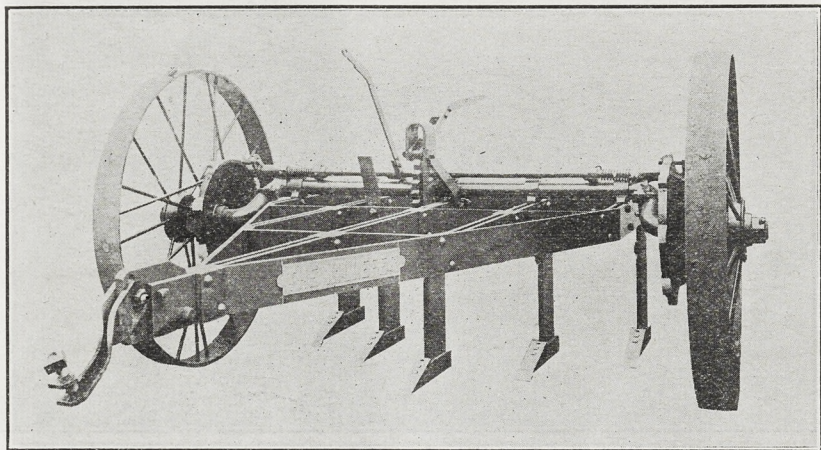
Killefer Automatic Tractor Disc

The Killefer Manufacturing Company
2209-2221 Santa Fe Avenue
Los Angeles, California

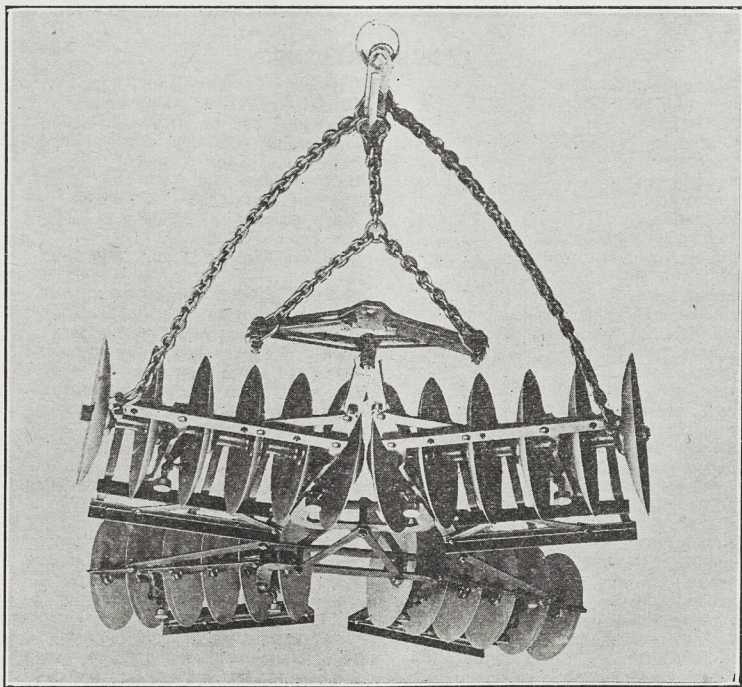
Factory Representative: George Flood, Sacramento, California

Manufacturers of:

DEEP TILLAGE AND OTHER AGRICULTURAL IMPLEMENTS
EXTRA HEAVY TRACTOR PLOWS
AUTOMATIC DOUBLE TRACTOR DISCS
AUTOMATIC COVER CROP DISCS
TRACTOR CHISELS **ORCHARD CULTIVATORS**
MONARCH CULTIVATORS **AUTOMATIC BEET PLOWS**
CROSS KILLS OR CLOD CRUSHERS
GOPHER OR DRAINAGE PLOWS **SUBSOIL PLOWS**
(One, Two, Three and Five Standards.)



Killefer Automatic Five Standard Subsoiler.



Killefer Disc Harrow.

SPECIFICATIONS.

Trade name—MONARCH.
Where made—WATERTOWN, WIS.
Type—TRACK.
H. P. draw bar—18.
H. P. belt—30.

Normal pull in pounds—

Low gear—4500.

Intermediate.

High gear—3300.

Length, inches—118.

Width, inches—72.

Height—72".

Outside turning radius, feet—5½'.

Weight with full equipment—7400.

Shipping weight—7100.

Number of wheels.

Diameter, drive wheels.

Diameter, other wheels.

Width of face of drive wheels.

Other wheels.

Number of tracks—2.

Width of tracks—12".

Length of track on ground—66".

Motor—BEAVER.

Type—HORIZONTAL.

Type of head—VALVE IN HEAD.

Number of cylinders—4.

Bore—4¾". Stroke—6".

Normal revolutions per minute—750.

Number of crank shaft bearings—3.

Front—3½".

Middle—3½".

Rear—4½".

Diameter of crank shaft—2⅝".

Total length of crank shaft bearings—11½".

Length of connecting-rod bearing—2¾".

Number of piston rings for piston—4.

Fuel recommended—GAS, DIST., KER.

Make of carburetor—BENNETT.

Size of carburetor.

Capacity of priming tank—5 GALS.

Capacity of fuel tank—15 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED and SPLASH
CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO AND IMPULSE
STARTER.

Make of ignition system—K. W.

Type of governor—LAUSON FLY-BALL.

Self-starter.

Diameter of belt pulley—14" or 16".

Width of face of belt pulley—6½" or 8".

R. P. M. of belt pulley—450.

Belt speed in feet per minute—1885.

Pulley drive—GEAR.

Location of belt pulley—RIGHT SIDE.

Transmission clutch—EXPANDING SHOE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1½.

Intermediate.

High—2.

Final drive—CHAIN.

Final drive, open.

Gear metal—HEAT TREATED, HARDENED
CUT STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—HYATT HEAVY DUTY.

Differential—HYATT HEAVY DUTY.

Rear axle.

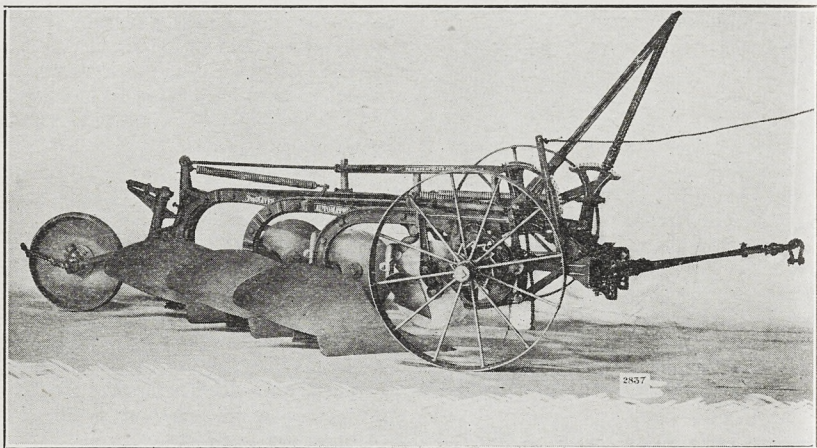
Front axle.

Fan—HYATT.

Pulley—HYATT.

Road clearance—17½".

Price F.O.B. Sacramento—\$2940.



Oliver Chilled Plow Works
South Bend, Indiana

9 Main Street, San Francisco

1321 Palmetto Street, Los Angeles

M. M. Mathews, Manager.

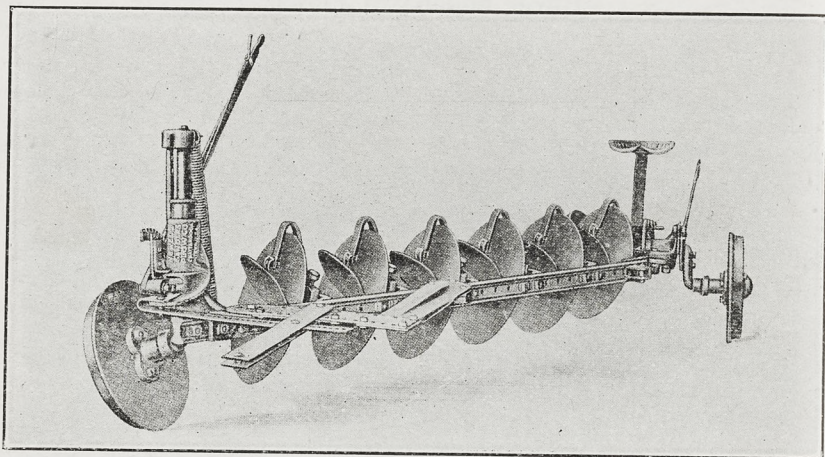
OLIVER CHILLED AND STEEL WALKING PLOWS
OLIVER CHILLED AND STEEL SULKY AND GANGS
OLIVER CHILLED AND STEEL TRACTOR MOULD BOARD GANGS
OLIVER POWER LIFT TRACTOR DISC PLOWS
OLIVER HARROWS
OLIVER LEVERLESS TRACTOR DISC HARROWS
OLIVER CULTIVATORS AND LISTERS
BLACK HAWK CORN, COTTON AND BEAN PLANTERS
THOMAS GRAIN DRILLS
THOMAS RAKES
THOMAS CORN MOWERS
DUNHAM CULTI PACKERS AND PULVERIZERS

Oliver Moldboard Plows.

Trade name and number..	No. 3	No. 7	No. 10	No. 78	No. 79	Bonanza	No. 31, deep tillage
Number of bottoms.....	1	2	3	2-3	4	4	3
Width of bottoms.....	14" 16"	10" 12" 14"	10"	10" 12" 14"	12" 14"	10"	14"
Kind of lift.....	Automatic power	Automatic power	Automatic power	Power	Power	Hand	Hand
Depth adjustment	Crank	Crank	Crank	Lever			
Type of beam.....	Rigid one beam	Rigid two beam	Rigid	Rigid	Rigid	Rigid	Rigid
Style of hitch.....	Rigid	Rigid	Rigid	Rigid	Stiff	Chain	Chain
Type of share.....	Q. D. or bolted	Q. D.	Bolted	Q. D.	Q. D.	Bolted	Bolted
Weight, pounds	480	685	1050	900-1000-1150	1445	1000	1400
Price f.o.b. Sacramento..	\$130	\$148	\$245	\$205-\$264.85	\$352.55	\$206.65	\$316.65

Oliver Disc Plows.

Trade name and number.....	D42	D43	D44	Knapp #103 orchard disc
Number of discs.....	2	3	4	3
Diameter of discs.....	24"	24"	24"	24"
Width of cut per disc.....	8"	9"	10"	10"
Kind of lift.....	Power	Power	Power	Automatic power
Style of hitch.....	Stiff	Stiff	Stiff	Flexible
Type of disc, bearing.....	Chilled	Chilled	Chilled	Chilled
Weight, pounds	1375	1550	1775	1175
Price f.o.b. Sacramento.....	\$254.75	\$287.65	\$321.70	\$270.00



Pacific Implement Company, Incorporated

Wholesalers of Farm Implements

131-153 Kansas Street, San Francisco, California

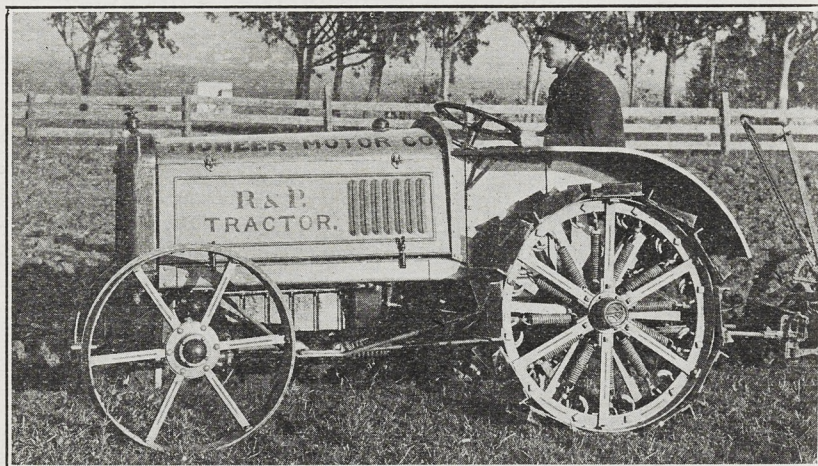
PLOWS (DISC AND MOULDBOARD)	HARROWS (DISC)
CUTTERS (ALFALFA AND ENSILAGE)	
BINDERS (CORN AND GRAIN)	DRILLS (GRAIN AND RICE)
ENGINES (GASOLINE)	
RAKES (SIDE DELIVERY AND BUCK)	
REAPERS	ROLLERS (LAND)
SEEDERS (BROADCAST)	PULVERIZERS (MULCHER)
TEDDERS	STACKERS (HAY)
WEEDERS	THRESHERS
	TRUCKS
	WAGONS
	PLANTERS (CORN AND COTTON)

Pacific Implement Company Disc Plows

	Sanders Light Tractor	Sanders Regular Engine	Sanders Cuban
Trade name and number.....			
Number of discs.....	2-3-4-5	4-5-6-7 or 8	4-5-6-7-8
Diameter of discs.....	24-26 or 28	24-26 or 28	24-26 or 28
Width of cut per disc.....	6-8-10-12	8-10 or 12"	8-10-12
Kind of lift.....	Plain or power	Plain or power	Plain
Style of hitch.....	Tractor	Tractor	Tractor
Type of disc bearing.....	Chilled	Chilled	Chilled
Weight	700 to 1500 lbs.	2000 to 3000 lbs.	3000 to 5000 lbs.
Price f.o.b. Sacramento.			

Pacific Implement Company Mold Board Plows

Trade name and number.....	<i>Pacific Implement Company</i>
Number of bottoms.....	2-3-4
Width of bottoms	10-12-14
Kind of lift.....	Power
Depth adjustment	Lever
Type of beam.....	
Style of hitch.....	Rigid and Independent Tractor
Type of share.....	Bolted
Weight	700 lbs. to 1500 lbs.
Price f.o.b. Sacramento.	



Pioneer Motor Company

305-311 Golden Gate Avenue

San Francisco

REPUBLIC TRUCKS

$\frac{3}{4}$ -Ton Special

Model 10—1 Ton

Model 19—2-2 $\frac{1}{2}$ Ton

Model 20—3 $\frac{1}{2}$ Ton

Model 11X—1 $\frac{1}{2}$ Ton

R. & P. TRACTOR

PEERLESS CARS

Model 56—Touring Car

Model 56—4-Passenger Roadster

Model 56—4-Passenger Coupe

Model 56—7-Passenger Sedan

SPECIFICATIONS.

Trade name—THE R. & P.

Where made—ALMA, MICH.

Type—WHEEL.

H. P. draw bar—12.

H. P. belt—20.

Normal pull in pounds—

Low gear—2200.

Intermediate.

High gear.

Length, inches—108.

Width, inches—65.

Height—60".

Wheel base.

Outside turning radius, feet—12.

Weight with full equipment.

Shipping weight—4000.

Number of wheels—4; 2 front, 2 rear.

Diameter, drive wheels—40".

Diameter, other wheels—32".

Width of face of drive wheels—11".

Other wheels—6".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—WAUKESHA.

Type—VERTICAL.

Type of head—"I".

Number of cylinders—4.

Bore—3 $\frac{3}{4}$ ". Stroke—5 $\frac{1}{4}$ ".

Normal revolutions per minute—900.

Number of crank shaft bearings—3.

Front—2 $\frac{1}{4}$ ".

Middle—2 $\frac{3}{4}$ ".

Rear—3".

Diameter of crank shaft—2".

Total length of crank shaft bearings—7 $\frac{3}{4}$ ".

Length of connecting-rod bearing.

Number of piston rings for piston—3.

Fuel recommended—GAS, DISTILLATE.

Make of carburetor—STROMBERG.

Size of carburetor—1 $\frac{1}{4}$ ".

Capacity of priming tank.

Capacity of fuel tank—19 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—SPLASH CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator—WAUKESHA.

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO AND IMPULSE

STARTER.

Make of ignition system—EISEMANN.

Type of governor—WAUKESHA.

Diameter of belt pulley—8".

Width of face of belt pulley—7".

R.P.M. of belt pulley—850.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—SIDE.

Transmission clutch—MULTIPLE DISC.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1 $\frac{1}{2}$.

Intermediate—2 $\frac{1}{2}$.

High—4 $\frac{1}{2}$.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—ALLOY STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—ROLLER.

Differential.

Rear axle.

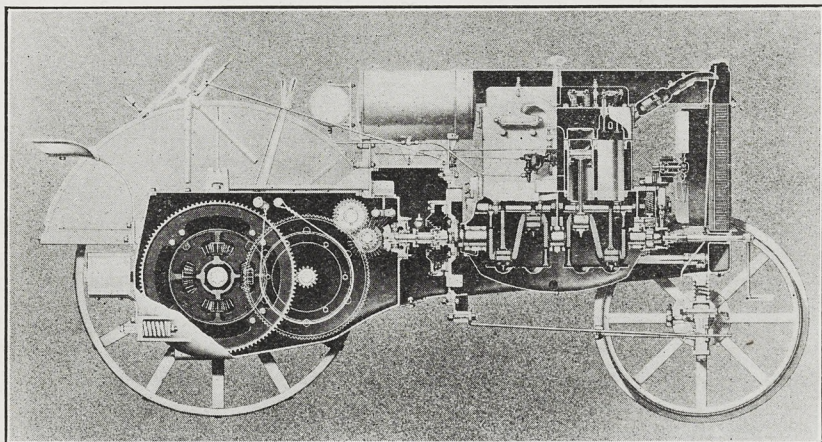
Front axle.

Fan—TIMKEN.

Pulley—TIMKEN.

Road clearance—20".

Price F.O.B. factory—\$1485.



Frank O. Renstrom Company

San Francisco

Los Angeles

Stockton

Sacramento

Distributor

TWIN CITY TRACTOR

SPECIFICATIONS.

Trade name—TWIN CITY.	Make and type of air cleaner—BENNETT.
Where made—MINNEAPOLIS, MINN.	Lubrication—FORCE FEED.
Type—WHEEL.	Type of oil pump—GEAR.
H. P. Draw bar—12.	Make of lubricator—OWN.
H. P. belt—20.	Oil circulating indicator in driver's vision—YES.
Normal pull in pounds—	
Low gear—2000.	Type of radiator—HONEYCOMB.
High gear—1550.	Water circulation—PUMP.
Length, inches—134".	Fan drive—BELT.
Width, inches—63".	Ignition—MAGNETO AND IMPULSE
Height—63½".	STARTER.
Outside turning radius, feet—12½'.	Make ignition system—BOSCH-AMERICAN.
Weight with full equipment.	Type of governor—PIERCE.
Shipping weight—5500.	Diameter of belt pulley—16".
Number and location of wheels—4.	Width of face of belt pulley—6".
Diameter, drive wheels—50".	R.P.M. of belt pulley—650.
Diameter, other wheels—34".	Belt speed in feet per minute—2700.
Width of face of drive wheels—12".	Pulley drive—DIRECT.
Other wheels—5¾".	Location of belt pulley—LEFT.
Number of tracks.	Transmission clutch—DRY PLATE.
Width of tracks.	Final drive clutches.
Length of track on ground.	Transmission system—SLIDING GEAR.
Motor—OWN.	Miles per hour: Low—2.2.
Type—VERTICAL.	High—2.9.
Type of head—VALVE IN HEAD.	Final drive—GEAR.
Number of cylinders—4.	Final drive—ENCLOSED.
Bore—4¼". Stroke—6".	Gear metal—FORGED STEEL.
Normal revolutions per minute—1000.	BEARINGS—Ball, Roller, Plain or Oilless.
Number of crank shaft bearings—3.	Transmission—HYATT' ROLLER.
Front—3 1/16".	Differential—HYATT.
Middle—2⅝".	Rear axle—4 HYATT' ROLLER.
Rear—4".	Front axle—2 HYATT; 2 OWN.
Diameter of crank shaft—2⅝".	Fan—2 BALL; 1 OWN PLAIN.
Total length of crank shaft bearings—9 11/16".	Pulley—HYATT.
Length of connecting-rod bearing.	Road clearance—10".
Number of piston rings for piston—4.	Price F.O.B. factory—\$1595.
Fuel recommended—KEROSENE.	Price F.O.B. Los Angeles—\$1795.
Make of carburetor—HOLLEY.	San Francisco—\$1795.
Size of carburetor—1¼".	Sacramento—\$1795.
Capacity of priming tank—3½ GALS.	Fresno—\$1795.
Capacity of fuel tank—23 GALS.	

SPECIFICATIONS.

Trade name—TWIN CITY.
 Where made—MINNEAPOLIS, MINN.
 Type—WHEEL.
 H. P. draw bar—16.
 H. P. belt—30.
 Normal pull in pounds—
 Low gear—3000.
 High gear—2300.
 Length, inches—179.
 Width, inches—70.
 Height—72".
 Outside turning radius, feet—16½.
 Weight with full equipment 10,300.
 Shipping weight.
 Number wheels—2 REAR, 2 FRONT.
 Diameter, drive wheels—54".
 Diameter, other wheels—36".
 Width of face of drive wheels—14".
 Other wheels—7".
 Number of tracks.
 Width of tracks.
 Length of track on ground.
 Motor—OWN.
 Type—VERTICAL.
 Type of head—"L".
 Number of cylinders—4.
 Bore—5". Stroke—7½".
 Normal revolutions per minute—650.
 Number of crank shaft bearings—3.
 Front.
 Middle.
 Rear.
 Diameter of crank shaft—2½".
 Length of crank shaft bearings.
 Length of connecting-rod bearing.
 Number of piston rings for piston—5.
 Fuel recommended—GAS, KEROSENE.
 Make of carburetor—HOLLEY.
 Size of carburetor—1½".

Capacity of priming tank—3½ GALS.
 Capacity of fuel tank—33 GALS.
 Make and type of air cleaner—BENNETT.
 Lubrication—SPLASH CIRCULATING.
 Type of oil pump—PLUNGER.
 Make of lubricator—DETROIT.
 Oil circulating indicator in driver's vision—
 YES.
 Type of radiator—Honeycomb.
 Water circulation—PUMP.
 Fan drive—BELT.
 Ignition—MAGNETO AND IMPULSE
 STARTER.
 Make of ignition system—K. W.
 Type of governor—OWN FLY-BALL.
 Diameter of belt pulley—17".
 Width of face of belt pulley—8".
 R. P. M. of belt pulley—528.
 Belt speed in feet per minute—2350.
 Pulley drive—DIRECT.
 Location of belt pulley—RIGHT.
 Transmission clutch—CONTRACTING BAND.
 Final drive clutches.
 Transmission system.
 Miles per hour: Low—2.
 High—2.75.
 Final drive.
 Final drive—ENCLOSED.
 Gear metal—FORGED STEEL HARDENED.
 BEARINGS—Ball, Roller, Plain or Oilless.
 Transmission—HYATT ROLLER.
 Differential—HYATT ROLLER.
 Rear axle—HYATT ROLLER.
 Front axle—HYATT ROLLER.
 Fan—OWN PLAIN.
 Pulley—OWN PLAIN.
 Road clearance.
 Price F.O.B. factory—\$2400.

SPECIFICATIONS.

Trade name—TWIN CITY.	Capacity of fuel tank—95 GALS.
Where made—MINNEAPOLIS, MINN.	Make and type of air cleaner—BENNETT.
Type—WHEEL.	Lubrication—FORCE FEED and SPLASH CIRCULATING.
H. P. draw bar—60.	Type of oil pump—GEAR.
H. P. belt—90.	Make of lubricator—DETROIT.
Normal pull in pounds—	Oil circulating indicator in driver's vision— YES.
Low gear—11,250.	
Length, inches—262.	Type of radiator—HONEYCOMB.
Width, inches—114.	Water circulation—PUMP.
Height—122".	Fan drive—BELT.
Outside turning radius, feet—24.	Ignition—MAGNETO AND IMPULSE STARTER.
Weight with full equipment—32,500.	
Shipping weight—28,500.	Make of Ignition system—K. W.
Number wheels—2 REAR, 2 FRONT.	Type of governor—OWN.
Diameter, drive wheels—84".	Diameter of belt pulley—23".
Diameter, other wheels—42".	Width of face of belt pulley—10½".
Width of face of drive wheels—30".	R.P.M. of belt pulley—535.
Other wheels—16".	Belt speed in feet per minute—3200.
Number of tracks.	Pulley drive—GEAR.
Width of tracks.	Location of belt pulley—RIGHT.
Length of track on ground.	Transmission clutch—CONTRACTING BAND.
Motor—OWN.	Final drive clutches—2.
Type—VERTICAL.	Transmission system—SPUR AND BEVEL GEAR.
Type of head—"L".	
Number of cylinders—6.	Miles per hour: Low—2.
Bore—7¼". Stroke—9".	Final drive—EXTERNAL SPUR.
Normal revolutions per minute—535.	Final drive—OPEN.
Number of crank shaft bearings—7.	Gear metal—FORGED STEEL; SEMISTEEL.
Front.	BEARINGS—Ball, Roller, Plain or Oilless.
Middle.	Transmission—HEAVY DUTY BABBITT.
Rear.	Differential.
Diameter of crank shaft—3½".	Rear axle.
Length of crank shaft bearings.	Front axle.
Length of connecting-rod bearing.	Fan.
Number of piston rings for piston—4.	Pulley.
Fuel recommended—GAS, KEROSENE.	Road clearance.
Make of carburetor—KINGSTON.	Price F.O.B. factory—\$5850.
Size of carburetor—3".	
Capacity of priming tank—10 GALS.	

SPECIFICATIONS.

Trade name—TWIN CITY.
Where made—MINNEAPOLIS, MINN.

Type—WHEEL.

H. P. draw bar—40.

H. P. belt—65.

Normal pull in pounds—

Low gear—7500.

Intermediate.

High gear.

Length, inches—240.

Width, inches—102.

Height—122".

Outside turning radius, feet—21.

Weight with full oil, equipment—28,500.

Shipping weight.

Number wheels—2 REAR, 2 FRONT.

Diameter, drive wheels—84".

Diameter, other wheels—42".

Width of face of drive wheels—24".

Other wheels—12".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—OWN.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—7¼". Stroke—9".

Normal revolutions per minute—535.

Number of crank shaft bearings—5.

Front.

Middle.

Rear.

Diameter of crank shaft—3½".

Total length of crank shaft bearings.

Length of connecting-rod bearing.

Number of piston rings for piston—4.

Fuel recommended—GAS, KEROSENE.

Make of carburetor—KINGSTON.

Size of carburetor—2½".

Capacity of priming tank—10 GALS.

Capacity of fuel tank—95 GALS.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE AND CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator—DETROIT.

Oil circulating indicator in driver's vision—
YES.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO AND IMPULSE
STARTER.

Make of ignition system—K. W.

Type of governor—OWN FLY-BALL.

Self-starter.

Diameter of belt pulley—23"

Width of face of belt pulley—10½".

R.P.M. of belt pulley—535.

Belt speed in feet per minute—3200.

Pulley drive—GEAR.

Location of belt pulley—RIGHT.

Transmission clutch—CONTRACTING BAND.

Final drive clutches—2.

Transmission system.

Miles per hour: Low—2.

Intermediate.

High.

Final drive—EXTERNAL SPUR.

Final drive—OPEN.

Gear metal—FORGED STEEL; SEMISTEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—HEAVY DUTY BABBITT.

Differential—HEAVY DUTY BABBITT.

Rear axle—HYATT.

Front axle—HYATT; OWN PLAIN.

Fan—OWN PLAIN.

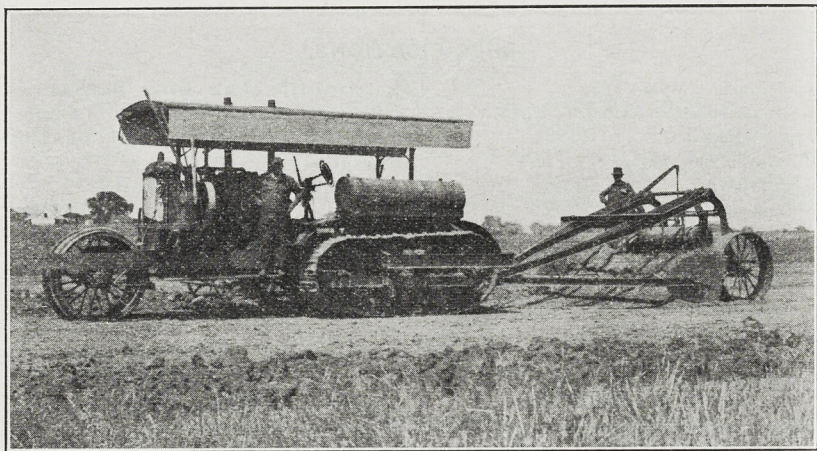
Pulley—OWN PLAIN.

Road clearance.

Price F.O.B. factory—\$4850.

SPECIFICATIONS.

Trade name—TWIN CITY.	Make and type of air cleaner—BENNETT.
Where made—MINNEAPOLIS, MINN.	Lubrication—FORCE FEED and SPLASH
Type—WHEEL.	CIRCULATING
H. P. draw bar—25.	Type of oil pump—GEAR.
H. P. belt—45.	Make of lubricator—MECHANICAL-
Normal pull in pounds—	DETROIT
Low gear—6700.	Oil circulating indicator in driver's vision—
Intermediate.	YES
High gear—4700.	Type of radiator—HONEYCOMB.
Length, inches—219.	Water circulation—PUMP.
Width, inches—81.	Fan drive—BELT.
Height—124".	Ignition—MAGNETO and IMPULSE
Outside turning radius, feet—18½.	STARTER
Weight with full equipment—16,500.	Make of ignition system—K. W.
Shipping weight—20,000.	Type of governor—FLY-BALL.
Number wheels—2 REAR, 2 FRONT.	Self-starter.
Diameter, drive wheels—76".	Diameter of belt pulley—20".
Diameter, other wheels—42".	Width of face of belt pulley—8½".
Width of face of drive wheels—20".	R. P. M. of belt pulley—600.
Other wheels—10".	Belt speed in feet per minute—3150.
Number of tracks.	Pulley drive—GEAR.
Width of tracks.	Location of belt pulley—RIGHT.
Length of tracks on ground.	Transmission clutch—CONTRACTING BAND.
Motor—OWN.	Final drive clutches.
Type—VERTICAL.	Transmission system—SPUR and BEVEL
Type of head—"L."	GEAR
Number of cylinders—4.	Miles per hour: Low—1.4.
Bore—6½". Stroke—8".	Intermediate.
Normal revolutions per minute—600.	High—2.
Number of crank shaft bearings—3.	Final drive—GEAR.
Front.	Final drive—OPEN.
Middle.	Gear metal—FORGED STEEL, SEMI-STEEL.
Rear.	BEARINGS—Ball, Roller, Plain or Oilless
Diameter of crank shaft—3".	Transmission—PLAIN HD BABBITT.
Total length of crank shaft bearings.	Differential—OWN PLAIN.
Length of connecting-rod bearing.	Rear axle—HYATT-BANTAM BAILL.
Number of piston rings for piston—4.	Front axle—CAST IRON.
Fuel recommended—GAS., KER.	Fan—BALL and PLAIN.
Make of carburetor—KINGSTON.	Pulley—HYATT.
Size of carburetor—2".	Road clearance.
Capacity of priming tank—10 gallons.	Price F.O.B. factory—\$3800.
Capacity of fuel tank—51 gallons.	



Schmeiser Manufacturing Company, Incorporated

Office and Factory: Davis, California

Exclusive Manufacturers of:

SCHMEISER LAND LEVELERS AND CHECKERS
 READ "SURE POP" ALMOND HULLERS AND SEPARATORS
 SCHANDONEY AND HARRINGTON EQUALIZING HITCHES
 PORTABLE AUTOMATIC DERRICKS
 SCHMEISER OLIVE GRADERS

Schmeiser Levelers and Checkers

Power Lift Land Levelers—

Giant—12-foot bucket, 4.35 cubic yards capacity, for 75-horsepower tractor.
 Junior—10-foot bucket, 3.50 cubic yards capacity, for 60-horsepower tractor.
 Junior A—8-foot bucket, 2 cubic yards capacity, for 40-horsepower tractor.

Hand Lift Land Levelers—

Midget—8-foot bucket, 2 cubic yards capacity, for 40-horsepower tractor or 11 good horses.
 Midget A—6-foot bucket, 1 cubic yard capacity, for 20-25-horsepower tractor or 8 good horses.

Land Checkers—

Steel or wood, standard sizes or special to order.

Almond Hullers and Separators—

Three sizes from small orchard size to packing house size.

Equalizing Hitches—

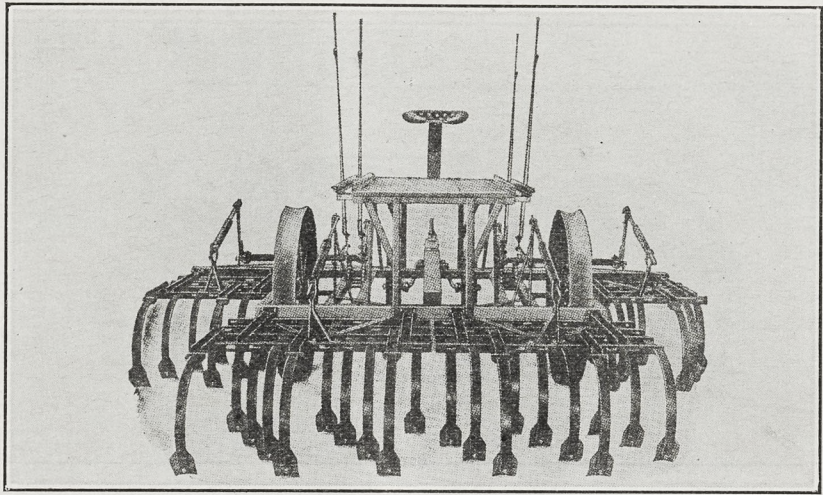
For any number of horses, 2 abreast, 4 abreast, 6 abreast.

Portable Hay Derrick—

Capacity, one thousand pounds per load.

Olive Graders—

Standard four pickling grades and the oil grade. Special grades to order.



The H. C. Shaw Company
Stockton, California

Exclusive Sales Agencies for Northern California and Western Nevada:

S. L. Allen & Co., Planet Junior Cultivators.
Light Draft Harrow Company, Forkner Cultivators.
Cutaway Harrow Company, Clark Disc Harrows.
Roderick-Lean Manufacturing Company, Disc, Spring Tooth, and Spike Tooth Harrows.
American Seeding Machine Company, Superior Grain Drills.
Western Land Roller Company, Western Pulverizers.
Bain Wagon Company, Bain Wagons.
Emerson-Brantingham Implement Company, Osborne Harvesting Machinery.
Smith Manufacturing Company, Shawstockton Header Gears.
Appleton Manufacturing Company, Corn Huskers, Shredders and Shellers.
Wiard Plow Company, Universal Bean Harvesters.

Agencies:

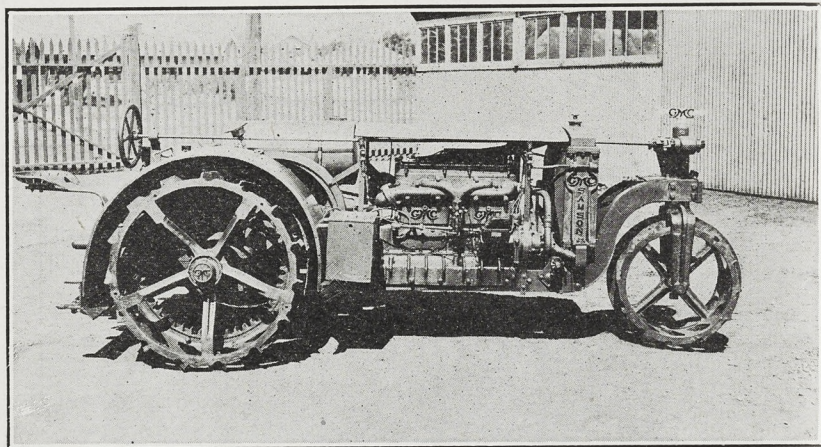
Empire Plow Company, Steel Age Cultivators.
Havana Metal Wheel Company, Metal Wheel Trucks.
Solano Iron Works, Gem Seeders and Fresno Scrapers.
F. E. Meyers and Bros., Hay Tools and Spray Pumps.

Manufacturers of:

Stockton Gang Plows, Morgan Spading Harrows, Victor Disc Harrows, Victor Pulverizers, Rotary Harrows, Bunch Rakes, Bean Sled Cutters.

H. C. Shaw Company, Shawstockton Gang Plow

Trade name and number-----	Shawstockton Gang Plow
No. of bottoms-----	4
Width of bottoms-----	14
Kind of lift-----	Hand
Depth adjustment-----	Lever
Type of beam-----	Rigid wood
Style of hitch-----	Rod with ring
Type of share-----	Q. D.
Weight-----	2000 lbs.
Price f. o. b. Sacramento-----	\$337.00 less 5% cash



Harrison P. Smith

Sole Distributor

76 Eighth Street, San Francisco

SAMSON-SIEVE GRIP TRACTORS

Factories:

Stockton, California

Janesville, Wisconsin

Harrison P. Smith, Inc.	San Francisco and San Jose
Factory	Stockton
R. G. Root	Sacramento
Schmidt Pump House	Marysville
I. J. Wightman	Chico
Glover Garage	Redding
Oscar C. Schultz & Co.	Dixon
Chris. Sieber & Co.	Woodland
Samson Sales Company	Southern California
Proctor Implement Co.	Santa Rosa
Lumblade & Jewett	Eureka
Walter Cameron	Hanford
W. H. Duncan	Reno, Nevada
Wyman Machinery Co.	Phoenix, Arizona
Stuart & Brown	Watsonville and Salinas
Ladd Hardware Co.	Hollister

Pacific Coast Manager General Motors Truck Company

G. M. C. Trucks

$\frac{3}{4}$ to 1 Ton; $1\frac{1}{2}$ to 2 Ton; $3\frac{1}{2}$ to 5 Ton.

SPECIFICATIONS.

Trade name—SAMSON SIEVE GRIP.

Where made—STOCKTON, CALIF.

Type—WHEEL.

H. P. draw bar—15.

H. P. belt—30.

Normal pull in pounds—2500.

Low gear.

Intermediate.

High gear.

Length, inches—160.

Width, inches—64½.

Height—56".

Outside turning radius, feet—13½.

Weight with full equipment—6100.

Shipping weight—5800.

Number of wheels—3; 2 REAR DRIVE, 1 FRONT.

Diameter, drive wheels—41".

Diameter, other wheels—28".

Width of face of drive wheels—18".

Other wheels—14½".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—SAMPSON.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—4¾". Stroke—6".

Normal revolutions per minute—850.

Number of crank shaft bearings—3.

Front—3¾".

Middle—3¾".

Rear—4¼".

Diameter of crank shaft—2⅝".

Total length of crank shaft bearings—11¾".

Length of connecting-rod bearing—2 15/16".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—MARVEL.

Size of carburetor—1¼".

Capacity of priming tank.

Capacity of fuel tank—23 GALS.

Make and type of air cleaner—SAMSON.

Lubrication—FORCE FEED.

Type of oil pump—GEAR.

Make of lubricator.

Oil circulating indicator in driver's vision—YES.

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—BATTERY GENERATOR.

Make of ignition system—REMY.

Type of governor—REMY.

Diameter of belt pulley—OPTIONAL.

Width of face of belt pulley—OPTIONAL.

R.P.M. of belt pulley—850.

Belt speed in feet per minute.

Pulley drive—DIRECT.

Location of belt pulley—REAR.

Transmission clutch—INTERNAL EXPANDING.

Final drive clutches—INTERNAL EXPANDING.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1½ TO 3½.

Intermediate.

High.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—ALLOY STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—PLAIN.

Differential—PLAIN.

Rear axle—ROLLER.

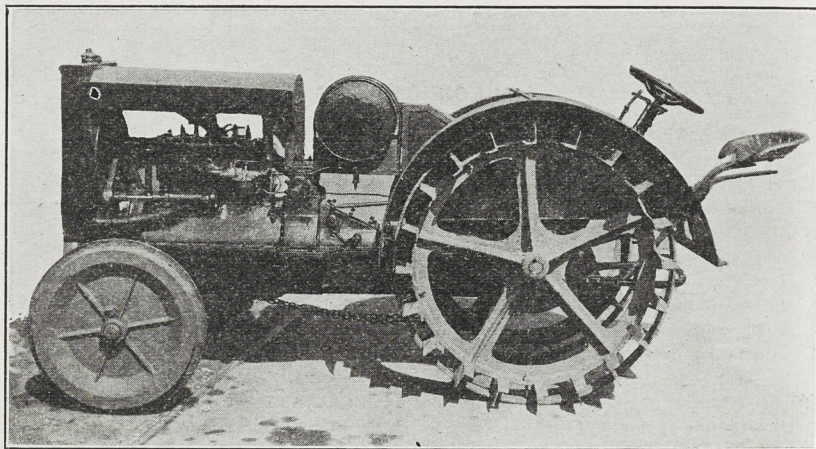
Front axle—ROLLER.

Fan—ROLLER.

Pulley—PLAIN.

Road clearance.

Price F.O.B. factory—\$1626.50.



Stockton Tractor Company.

Stockton, California

FACTORY BRANCH:

1204 Eighth Street, Sacramento, California

STOCKTON TRACTOR

SPECIFICATIONS.

Trade name—STOCKTON.
Where made—STOCKTON, CAL.
Type—WHEEL.

H. P. draw bar—6.
H. P. belt—12.
Normal pull in pounds—
Low grade—1400.

Intermediate.
High gear—1000.

Length, inches—96.

Width, inches—48.

Height—52".

Wheel base.

Outside turning radius, feet—9.

Weight with full equipment—3090.

Shipping weight—2960.

Number wheels—4.

Diameter, drive wheels—44".

Diameter, other wheels—22".

Width of face of drive wheels—11".

Other wheels—5".

Number of tracks.

Width of tracks.

Length of track on ground.

Motor—HERSCHELL-SPILLMAN.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—4.

Bore—3½". Stroke—5".

Normal revolutions per minute—1100.

Number of crank shaft bearings—2.

Front—4".

Middle.

Rear—4".

Diameter of crank shaft—2".

Total length of crank shaft bearings—8".

Length of connecting-rod bearing—2½".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—KINGSTON.

Size of carburetor.

Capacity of priming tank.

Capacity of fuel tank—10 gallons.

Make and type of air cleaner—BENNETT.

Lubrication—FORCE FEED and SPLASH
CIRCULATING

Type of oil pump—GEAR.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO.

Make of ignition system—BERLING.

Diameter of belt pulley—12".

Width of face of belt pulley—6".

R. P. M. of belt pulley—400.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—LEFT-HAND SIDE.

Transmission clutch—MULTIPLE DISK.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—2½.

Intermediate.

High—3½.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—HARDENED STEEL.

BEARINGS—Ball, Roller, Plain or Oilless

Transmission—HYATT.

Differential—NONE.

Rear axle—HYATT.

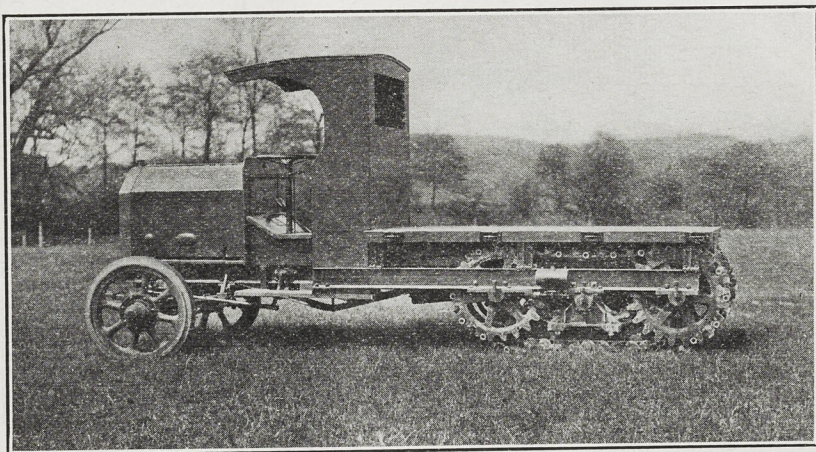
Front axle—SLEEVE.

Fan—BALL.

Pulley—BABBITT.

Road clearance—14".

Price F.O.B. Sacramento—\$1100.



B. H. Baird
786 Mission St., San Francisco.

SPECIFICATIONS.

Trade name—LINN TRACTOR.

Where made—MORRIS, N. Y.

Type—TRACK.

H. P. draw bar.

H. P. belt.

Normal pull in pounds—

Low gear.

Intermediate.

High gear.

Length, inches—198.

Width, inches—74.

Height—96".

Wheel base.

Outside turning radius, feet.

Weight with full equipment.

Shipping weight—9000.

Number of wheels—2 front.

Diameter, drive wheels.

Diameter, other wheels—36".

Width of face of drive wheels.

Other wheels—OPTIONAL.

Number of tracks—2.

Width of tracks—10½".

Length of track on ground—60".

Motor—CONTINENTAL.

Type—VERTICAL.

Type of head—"L."

Number of cylinders—4.

Bore—4½". Stroke—5½".

Normal revolutions per minute.

Number of crank shaft bearings—3.

Front.

Middle.

Rear.

Diameter of crank shaft.

Length of crank shaft bearings.

Length of connecting-rod bearing.

Number of piston rings for piston.

Fuel recommended—OPTIONAL.

Make of carburetor—SHEBLER.

Size of carburetor.

Capacity of priming tank.

Capacity of fuel tank—30½ gallons.

Make and type of air cleaner.

Lubrication—FORCE FEED.

Type of oil pump—GEAR.

Make of lubricator.

Type of radiator—HONEYCOMB.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO.

Make of ignition system—AMER. BOSCH.

Type of governor—PIERCE.

Self-starter.

Diameter of belt pulley.

Width of face of belt pulley—5½".

R. P. M. of belt pulley.

Belt speed in feet per minute.

Pulley drive—DIRECT, GEAR.

Location of belt pulley.

Transmission clutch—CONE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low.

Intermediate.

High.

Final drive—GEAR.

Final drive—ENCLOSED.

Gear metal—TISCO MANGANESE STEEL.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—BROWN LIPE CHAPIN.

Differential—BROWN LIPE CHAPIN.

Rear axle.

Front axle—SELDEN.

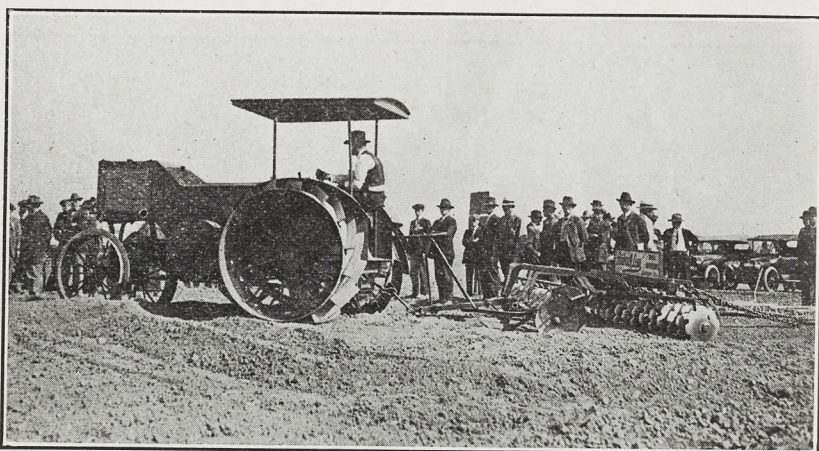
Fan.

Pulley.

Road clearance—12½".

Price F.O.B. factory—\$4500.

San Francisco—\$4850.



Vandercook & Meng
Distributors

311 J Street, Sacramento, California
SANDUSKY TRACTOR

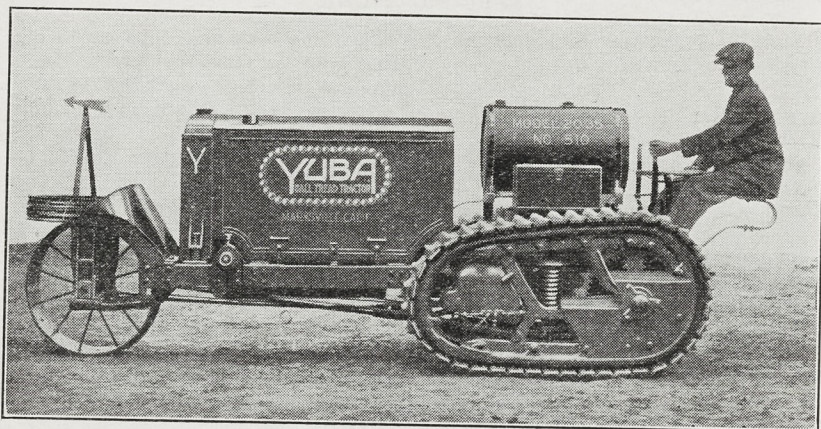
SPECIFICATIONS.

Trade name—SANDUSKY MODEL "J" 10-20.
Where made—SANDUSKY, OHIO.
Type.
H. P. draw bar—10.
H. P. belt—20.
Normal pull in pounds—
 Low gear—3000.
 Intermediate.
 High gear—2000.
Length, inches—120.
Width, inches—62.
Height—52".
Outside turning radius, feet—10½.
Weight with full equipment—4000.
Shipping weight—3800.
Number of wheels—4. 2 front; 2 rear.
Diameter, drive wheels—48".
Diameter, other wheels—32".
Width of face of drive wheels—18".
 Other wheels—6".
Number of tracks.
Width of tracks.
Length of track on ground.
Motor—OWN.
Type—VERTICAL.
Type of head—"L."
Number of cylinders—4.
 Bore—4¼". Stroke—5¼".
Normal revolutions per minute—950.
Number of crank shaft bearings—3.
 Front—2 4/10".
 Middle—2 4/10".
 Rear—2 4/10".
Diameter of crank shaft—2½".
Total length of crank shaft bearings—7½".
Length of connecting rod bearing—2¾".
Number of piston rings for piston—6.
Fuel recommended—DISTILLATE.
Make of carburetor—ENSGN.
Size of carburetor—1¼".
Capacity of priming tank—3 gallons.

Capacity of fuel tank—20 gallons.
Make and type of air cleaner—BENNETT.
Lubrication—FORCE FEED and SPLASH
CIRCULATING
Type of oil pump—PLUNGER.
Oil circulating indicator in driver's vision—
YES
Type of radiator—HONEYCOMB.
Water circulation—PUMP.
Fan drive—BELT.
Ignition—MAGNETO and IMPULSE
STARTER
Make of ignition system—DIXIE MAGNETO
No. 46
Type of governor—FLY-BALL.
Diameter of belt pulley—6"-8" or 10".
Width of face of belt pulley—6".
R. P. M. of belt pulley—950.
Belt speed in feet per minute—1980.
Pulley drive—BEVEL GEAR.
Location of belt pulley—R. H. CENTER SIDE
Transmission clutch—CONE.
Final drive clutches.
Transmission system.
Miles per hour: Low—1½.
 Intermediate.
 High—2½.
Final drive—TIMKEN DAVID BROWN
WORM
Final drive—CLOSED.
Gear metal—NICKEL-CHROME.
 BEARINGS—Ball, Roller, Plain or Oilless
Transmission—HYATT ROLLER BEARINGS.
Differential.
Rear axle.
Front axle—BRONZE BEARINGS.
Fan—NEW DEPARTURE BALL.
Pulley—NEW DEPARTURE BALL.
Road clearance—20".
Price F.O.B. Sacramento—\$1837.50.

SPECIFICATIONS.

Trade name—SANDUSKY MODEL "E."	Capacity of priming tank—5 gallons.
Where made—SANDUSKY, OHIO.	Capacity of fuel tank—30 gallons.
Type.	Make and type of air cleaner—BENNETT.
H. P. draw bar—15.	Lubrication—FORCE FEED and SPLASH
H. P. belt—35.	CIRCULATING
Normal pull in pounds—	Type of oil pump—PLUNGER.
Low gear—4000.	Make of lubricator.
Intermediate—3000.	Oil circulating indicator in driver's vision—
High gear—2000.	YES
Length, inches—147.	Type of radiator—HONEYCOMB.
Width, inches—84.	Water circulation—PUMP.
Height—72".	Fan drive—CHAIN.
Outside turning radius, feet—15.	Ignition—MAGNETO and IMPULSE
Weight with full oil, fuel and lug equipment—	STARTER
8400	Make of ignition system—DIXIE.
Shipping weight—8000.	Type of governor—FLY-BALL.
Number of wheels—4. 2 front; 2 rear.	Self-starter—NO.
Diameter, drive wheels—56".	Diameter of belt pulley—16".
Diameter, other wheels—34".	Width of face of belt pulley—12".
Width of face of drive wheels—24".	R. P. M. of belt pulley—750.
Other wheels—8".	Belt speed in feet per minute—3000.
Number of tracks.	Pulley drive: DIRECT CENTRIFUGAL.
Width of tracks.	Location of belt pulley—RIGHT-HAND SIDE.
Length of track on ground.	Transmission clutch—SHOE.
Motor—OWN.	Transmission system—SLIDING GEAR.
Type—VERTICAL.	Miles per hour: Low—2.
Type of head—"L."	Intermediate—3½.
Number of cylinders—4.	* High—5½.
Bore—5". Stroke—6½".	Final drive—GEAR.
Normal revolutions per minute—750.	Final drive—OPEN.
Number of crank shaft bearings—3 main.	Gear metal—DROP-FORGED HIGH-CARBON
Front—4".	HEARTH
Middle—5".	BEARINGS—Ball, Roller, Plain or Oilless
Rear—6".	Transmission—PLAIN.
Diameter of crank shaft—2½".	Differential—PLAIN.
Total length of crank shaft bearings—15".	Rear axle—BRONZE.
Length of connecting-rod bearing—4".	Front axle—BRONZE.
Number of piston rings for piston—6.	Fan—BALL.
Fuel recommended—DISTILLATE.	Pulley—BALL.
Make of carburetor—ENSIGN.	Road clearance—15".
Size of carburetor—2".	Price F.O.B. factory—\$2992.50.



Yuba Manufacturing Company

Factories: Marysville and Benicia

Main Office and Accounting Department: Marysville, California

BRANCH SALES OFFICES:

Los Angeles, Cal., 202 N. Los Angeles Street: A. F. George Company, Inc., *Dealer*

Fresno, Cal., 1837 Merced Street: A. F. George Company, Inc., *Dealer*

San Jose, Cal., 445-449 W. Santa Clara St.: San Jose Tractor & Truck Co., *Dealer*

Napa, Cal.: Young Hardware Company, *Dealer*

Paso Robles, Cal.: Booth Bros., *Dealer*

Santa Rosa, Cal.: Ketterlin Bros., *Dealer*

Woodland, Cal.: Electric Garage Company, *Dealer*

Willows, Cal., P. O. Box 427: A. G. Streblov, *Salesman*

Marysville, Cal.: J. B. Moorhead, *Salesman*

Stockton, Cal., 342 Eldorado Street: Pengilly and Clarke, *Dealer*

Walla Walla, Wash., 225 E. Alder St.: Inland Truck and Tractor Co., Inc., *Dealer*

Spokane, Wash., 30 E. Sprague ave.: Inland Truck and Tractor Co., Inc., *Dealer*

Pendleton, Oregon: Inland Truck and Tractor Co., Inc., *Dealer*

Portland, Oregon: Howard-Cooper Corporation, *Dealer*

Hawaiian & Philippine Islands: Honolulu Iron Works, *Dealer*

SPECIFICATIONS.

Trade name—YUBA BALL TREAD.

Where made—BENICIA, CALIF.

Type—TRACK.

H. P. draw bar—12.

H. P. belt—20.

Normal pull in pounds—

Low gear.

Intermediate—3400.

High gear.

Length, inches—149.

Width, inches—55.

Height—55".

Outside turning radius, feet—8.

Weight with equipment—6800.

Shipping weight—6750.

Number of wheels—TILLER WHEEL IN

FRONT.

Diameter, drive wheels.

Diameter, other wheels.

Width of face of drive wheels.

Other wheels.

Number of tracks—2.

Width of tracks—13".

Length of track on ground—63".

Motor—WAUKESHA.

Type—VERTICAL.

Type of head—"L".

Number of cylinders—4.

Bore—4½". Stroke—6¾".

Normal revolutions per minute—700.

Number of crank shaft bearings—3.

Front.

Middle.

Rear.

Diameter of crank shaft—2".

Total length of crank shaft bearings—12¼".

Length of connecting-rod bearing—3".

Number of piston rings for piston—3.

Fuel recommended—DISTILLATE.

Make of carburetor—ENSIGN.

Size of carburetor—1¼".

Capacity of priming tank—1 QUART.

Capacity of fuel tank—27 GALS.

Make and type of air cleaner—DONALDSON.

Lubrication—FORCE FEED AND SPLASH
CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator.

Oil circulating indicator in driver's vision—

YES.

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO.

Make of ignition system—BOSCH.

Type of governor—WAUKESHA.

Self-starter.

Diameter of belt pulley—12".

Width of face of belt pulley—6¾".

R.P.M. of belt pulley—700.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—REAR.

Transmission clutch—DRY PLATE.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—1.5.

Intermediate—2.08.

High—4.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—¾% NICKEL FORGING

HARDENED.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—ROLLER.

Differential—ROLLER.

Rear axle.

Front axle—BABBITT.

Fan—RADIAL BALL.

Pulley—ROLLER.

Road clearance.

Price F.O.B. factory—\$3100.

SPECIFICATIONS.

Trade name—YUBA BALL TREAD.
Where made—MARYSVILLE, CALIF.
Type—TRACK.

H. P. draw bar—20.

H. P. belt—35.

Normal pull in pounds—

Low gear.

Intermediate—5000.

High gear.

Length, inches—185.

Width, inches—73½.

Height—61".

Outside turning radius, feet—8.

Weight with full equipment—10,250.

Shipping weight—10,100.

Number wheels—1 IN FRONT.

Diameter, drive wheels.

Diameter, other wheels.

Width of face of drive wheels.

Other wheels.

Number of tracks—2.

Width of tracks—17½".

Length of track on ground—63".

Motor—WISCONSIN.

Type—VERTICAL.

Type of head—"T".

Number of cylinders—4.

Bore—5¼". Stroke—7".

Normal revolutions per minute—700.

Number of crank shaft bearings—3.

Front.

Middle.

Rear.

Diameter of crank shaft—5⅝"

Total length of crank shaft bearings—13½".

Length of connecting-rod bearing—3½".

Number of piston rings for piston—4.

Fuel recommended—DISTILLATE.

Make of carburetor—STROMBERG.

Size of carburetor—M3.

Capacity of priming tank—8 GALS.

Capacity of fuel tank—38 GALS.

Make and type of air cleaner—DONALDSON.

Lubrication—FORCE FEED AND SPLASH
CIRCULATING.

Type of oil pump—GEAR.

Make of lubricator.

Oil circulating indicator in driver's vision—
YES.

Type of radiator—TUBULAR.

Water circulation—PUMP.

Fan drive—BELT.

Ignition—MAGNETO.

Make of ignition system—BOSCH AMERI-
CAN.

Type of governor—MONARCH.

Self-starter.

Diameter of belt pulley—10", 12", 14".

Width of face of belt pulley—8½".

R.P.M. of belt pulley—700.

Belt speed in feet per minute.

Pulley drive—GEAR.

Location of belt pulley—SIDE.

Transmission clutch—2 PARAGON
CLUTCHES.

Final drive clutches.

Transmission system—SLIDING GEAR.

Miles per hour: Low—2.06.

Intermediate.

High—3.28.

Final drive—GEAR.

Final drive—OPEN.

Gear metal—¾% NICKEL FORGING

HARDENED.

BEARINGS—Ball, Roller, Plain or Oilless.

Transmission—ROLLER BEARING

THROUGHOUT.

Differential.

Rear axle—ROLLER.

Front axle—BABBITT.

Fan—BALL-RADIAL.

Pulley—ROLLER.

Road clearance.

Price F.O.B. factory—\$4700.

F. Somers Peterson Company
53-57 California Street, San Francisco, California

Factory Representatives:

American Metal Hose Company: Flexible Metallic Tubing for All Purposes.
 Baker-Hansen Manufacturing Company: Air Compressors, Vacuum Pumps, Blowers.
 Ericsson Manufacturing Company: Berling Magnetos.
 F. A. B. Manufacturing Company: Fabco Hand Pumps for All Liquids.
 Fafnir Bearing Company: Fafnir Ball Bearings.
 Lowell Wrench Company: Reversible Ratchet Wrenches.
 McCrosky Tool Corporation: Adjustable Reamers, Turrets, Chucks.
 Modine Manufacturing Company: Spirex Radiators.
 Standard Parts Company: Bock Roller Bearings, Stan-Par Axles.
 Twin Disc Clutch Company: Truck and Tractor Clutches.
 Veeder Manufacturing Company: Odometers, Cyclometers, Counters.
 San Francisco stocks carried.

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538-546 Golden Gate Avenue
San Francisco

Exclusive Distributors on Pacific Coast:

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 SCHEBLER CARBURETORS
 LALLEY ELECTRO LIGHTING PLANTS
 GOULD BATTERIES
 RED SEAL BATTERIES
 BURD PISTON RINGS

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Reimers Electrical Company	-----	Marysville
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DIXIE MAGNETOS WITH INCLOSED IMPULSE STARTER COUPLING
 SPLITDORF GREEN JACKET SPARK PLUGS
 IGNITION CABLE
 LIGHTING GENERATORS FOR TRACTORS
 MUNGER "ALWAYS TIGHT" PISTON RINGS

Wraith, Scorsur & Peet
Orange Cove, California

IMPLEMENT SPECIALISTS

Sole Agents for California North of Bakersfield

JESSEN GOOSENECK CULTIVATOR

Made in any size for horses and tractors

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Averill Machinery Company	499 North San Pedro road, San Jose
Avery Company of the Pacific Coast	69 Beale street, San Francisco
Baranger-Weaver	Merchants Exchange Building, San Francisco
Barnard, W. E.	67 Beale street, San Francisco
Bean Spray Pump Company	Santa Clara avenue, San Jose
Bear Tractor Company	Hotel Land, Sacramento
Best, C. L., Gas Traction Company	San Leandro
Baird, B. H.	786 Mission street, San Francisco
Boswell, Douglas Company	Seventh and M streets, Sacramento
Butler-Veitch	Syndicate Building, Oakland
California Cultivator	Marsh-Strong Building, Los Angeles
California Moline Plow Company	1026 East Main street, Stockton
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Carter, H. V., Motor Company	724 Van Ness avenue, San Francisco
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Cleveland Tractor Company	New Montgomery street, San Francisco
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Conley, J. M., Company, Inc.	417 East Weber avenue, Stockton
Dauch Manufacturing Company	315 South Los Angeles street, Los Angeles
Deere, John, Plow Company	651 Brannan street, San Francisco
DeLaval Dairy Supply Company	61 Beale street, San Francisco
Dimond, Frank	1800 R street, Sacramento
Electric Wheel Company	914 Story Building, Los Angeles
Emigh-Winchell Hardware Company	715 J street, Sacramento
Fageol Motors Company	107th avenue and Foothill blvd., Oakland
Farm Engineering Company	726 L street, Sacramento
Four-Drive Tractor Company	711 Hobart Building, San Francisco
Gerlinger, E. E.	112 Market street, San Francisco
Goodrich, Ballard & Rouse	Seventh and M streets, Sacramento
Grant & Company	Box 376, Sacramento
Gravity Grain Grader Company	328 North East street, Stockton, California
Grissel Brothers	311 North El Dorado street, Stockton
Hamilton, A. J.	201 People's Bank Bldg., Sacramento
Hart-Parr Company	1650 California street, San Francisco
Heald's Auto School	1220 Post street, San Francisco
Hollenbeck & Rhea	1006 Fifth street, Sacramento
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Huber Manufacturing Company	628 Hobart Building, Los Angeles
Hughson, William L., Company	1101 Van Ness avenue, San Francisco
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Implement and Vehicle Record	Phelan Building, San Francisco
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Logan-Cadwalader Company	1301 Van Ness avenue, San Francisco
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Monarch Diamond Oil Company	1284 Delaware street, Berkeley
Monarch Tractor Sales Company	120 South Aurora street, Stockton
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Splittorf Electrical Company	1022 Geary street, San Francisco
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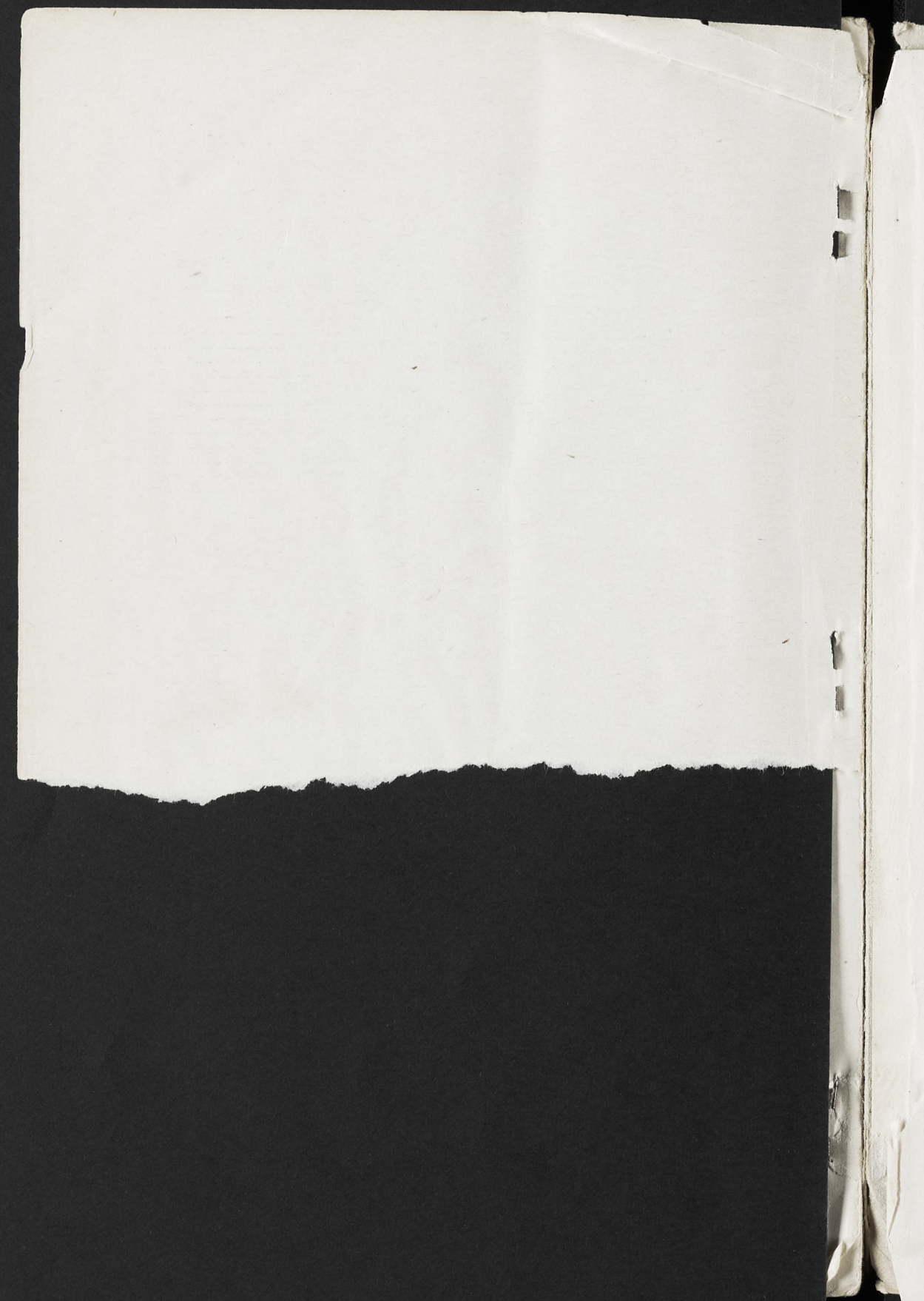
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TROUBLE CHART FOR GASOLINE ENGINES

